
final report

Maine Integrated Freight Plan

prepared for

Maine Department of Transportation

prepared by

Cambridge Systematics, Inc.
150 CambridgePark Drive, Suite 4000
Cambridge, Massachusetts 02140

February 22, 2002

Table of Contents

Executive Summary	ES-1
ES.1 Introduction	ES-1
ES.2 Project Approach.....	ES-2
ES.3 Maine’s Freight Profile	ES-3
ES.4 Recommendations.....	ES-11
 1.0 Introduction and Background.....	 1-1
1.1 Importance of Freight Transportation and Examples of Its Consideration by Other State DOTs.....	1-1
1.2 Organization of Report.....	1-4
 2.0 Project Approach	 2-1
2.1 Data Collection	2-1
2.2 Data Analysis.....	2-3
2.3 Public Participation.....	2-3
2.4 Develop Recommendations.....	2-3
2.5 Prepare the Updated Maine Integrated Freight Plan.....	2-4
 3.0 Maine’s Freight Profile.....	 3-1
3.1 Results of Stakeholder Participation	3-1
3.2 Economic and Demographic Data	3-16
3.3 Modal Descriptions and Developments	3-20
3.4 Examples of the Logistics Patterns of Maine Shippers	3-40
3.5 Role of the Internet for Freight Transportation	3-51
 4.0 Commodity Flow Patterns	 4-1
4.1 Overview of Freight Flows	4-1
4.2 Mode Split Analysis.....	4-4
4.3 Identification of Top Commodities.....	4-5
4.4 Impact of Freight Value on Commodity Flows	4-6
4.5 Key Findings	4-7
 5.0 Findings, Conclusions, and Recommendations	 5-1
5.1 Findings and Conclusions	5-1
5.2 Recommendations	5-5

Table of Contents (continued)

Appendix A

Project Approach

Appendix B

Carrier Interview Guide

Appendix C

Economic and Demographic Data

Appendix D

Commodity Flow Patterns

Appendix E

Load-Matching Web Sites

List of Tables

3.1	Maine Railroads	3-32
3.2	Description of a Cement Manufacturer	3-44
3.3	Description of a Paper Manufacturer	3-47
3.4	Description of Parcel Delivery Service	3-50
4.1	Base-Year and Future Tons and Growth Rates by Movement Type.....	4-3
D.1	Base-Year and Future Ton and Growth Rates by Movement Type and Direction.....	D-2

List of Figures

ES.1 Total Freight Flows in Maine by Type of Movement, 1998	ES-6
ES.2 Mode Shares for All Movements within Maine, 1998	ES-7
ES.3 Comparison of Weight and Value by Commodity Type for Cumberland County, Maine	ES-9
2.1 Technical Approach	2-2
3.1 Location of Survey and Interview Respondents	3-3
3.2 Number of Private Sector Survey and Interview Respondents by Company Size	3-4
3.3 Private Sector Survey and Interview Respondents Degree of Multimodalism	3-4
3.4 Average Scores, All Respondents	3-5
3.5 Average Scores by Company Size	3-6
3.6 Average Scores by Degree of Multimodalism	3-7
3.7 Unemployment Rates, 1990-1999	3-17
3.8 Distribution of Maine Employment by Industry, 1997-2020	3-18
3.9 Population Growth, Maine versus United States, 2000-2025	3-19
3.10 Manufacturing Share of Total Employment, 1990 and 1999	3-20
3.11 National Rail Commodities, 1999	3-28
3.12 Class I Railroad Performance, 1964-1998 (1981 = 100)	3-28
3.13 Rail Market Share, 1960-1999	3-30
3.14 Railroad Capital Costs and Return on Investment, 1990-1999	3-31

List of Figures

(continued)

3.15	Maine Rail Tonnage, 1991-1999	3-33
3.16	Top Rail Commodities for Maine, 1998.....	3-34
3.17	Illustration of Cement Manufacturer Logistics Patterns.....	3-43
3.18	Illustration of Paper Manufacturer Logistics Patterns	3-46
3.19	Illustration of Parcel Delivery Service Logistics Patterns	3-49
4.1	Freight Flows in Maine, 1991-2000.....	4-2
4.2	Total Pipeline Tonnage.....	4-2
4.3	Total Freight Flows in Maine by Type of Movement, 1998.....	4-3
4.4	Mode Shares for All Movements within Maine, 1998.....	4-5
4.5	Top Commodities in Maine, 1998	4-6
4.6	Comparison of Weight and Value by Commodity Type.....	4-8
A.1	Technical Approach	A-2
C.1	Unemployment Rates, 1990 and 1999.....	C-2
C.2	Unemployment Rates, 1990-1999	C-3
C.3	Employment Rates, 1990-1999	C-3
C.4	Distribution of Maine Employment by Industry, 1997-2020.....	C-4
C.5	Population Growth, 1990-2000	C-6
C.6	Maine Population Growth, 2000-2025	C-6
C.7	Population Growth, Maine versus United States, 2000-2025	C-7
C.8	Comparison of Annual Average Wages, 1998.....	C-7

List of Figures (continued)

C.9 Manufacturing Share of Total Employment, 1990 and 1999	C-8
C.10 Change in Manufacturing Employment, 1990-1999	C-8
C.11 Manufacturing Share of Employment and Wages in Maine, 1980-1998.....	C-9
D.1 Total External Freight Flows to and from Maine by Type and Direction.....	D-2
D.2 Commodity Flows by County, 1998	D-3
D.3 Commodity Flows by County, 2006	D-4
D.4 Mode Shares for Intrastate and Intracounty Movement, 1998 and 2006	D-6
D.5 Inbound Interstate Movements to Maine, 1998 and 2006	D-6
D.6 Outbound Interstate Movements from Maine, 1998 and 2006.....	D-7
D.7 Inbound Movements from Canada, 1998 and 2006	D-8
D.8 Outbound Movements to Canada, 1998 and 2006	D-8
D.9 Top Interstate Commodities for Maine, 1998	D-10
D.10 Top Interstate Commodities for Maine, 2006	D-10
D.11 Top Canada Commodities for Maine, 1998	D-11
D.12 Top Canada Commodities for Maine, 2006	D-11
D.13 Top Truck Commodities for Maine, 1998	D-12
D.14 Top Truck Commodities for Maine, 2006	D-12
D.15 Top Rail Commodities for Maine, 1998.....	D-13
D.16 Top Rail Commodities for Maine, 2006.....	D-14

Executive Summary

■ ES.1 Introduction

The Maine Department of Transportation (MDOT) recognizes the increasingly important role played by freight transportation in the management and growth of its region's overall transportation infrastructure, and in the promotion of Maine's economic vitality. The MDOT's Office of Freight Transportation has worked for consideration and advancement of freight improvement projects and has taken several significant steps in expanding its freight transportation planning activities. This effort was advanced with the completion of the first Integrated Freight Plan (IFP) in 1998. That plan summarized the freight system in Maine, how it was being used, what its key issues were, and recommended strategies for its improvement.

In an effort to continue its approach to addressing freight transportation within the State, the Maine DOT has completed this update to the original Integrated Freight Plan (IFP) in order to help create a more advanced, state-of-the-art freight program for the State. The goals of this updated IFP were to:

- Develop an updated freight profile for Maine reflecting changes to the freight transportation system and the evolution of the freight transportation industry;
- Build relationships with and identify the concerns of public and private freight stakeholders in the State;
- Document the progress and lessons learned since the completion of the original IFP in 1998; and
- Recommend specific freight improvement projects and changes to Maine's freight planning program.

Importance of Freight Transportation

In the Intermodal Surface Transportation Efficiency Act (ISTEA, enacted 1991) and the Transportation Efficiency Act for the 21st Century (TEA-21, enacted 1998), Congress encouraged the consideration of freight during statewide and metropolitan transportation planning processes. Freight was included among the planning factors in ISTEA and TEA-21, which helped focus federal, state, and Metropolitan Planning Organization (MPO) attention to freight issues. As a result, there is a growing awareness at the state level of the importance of freight transportation and a corresponding push to re-link state and local transportation investment, especially freight transportation investment, to economic development. Adequate transportation is considered to be one of several site location requirements and key factors (e.g., utilities, work-force skills, and tax structure) that affect a state's business costs, markets, and overall competitiveness for attracting business

investment. Essentially, all businesses require some level of transportation access to labor, materials, and customers in order to operate and survive. As such, transportation is a factor that influences the outcomes which local and regional economic development agencies are seeking to achieve – increasing their areas’ business attractions, expansions, retentions, and startups. As a result, state DOTs and business leaders are much more mindful today of the need to maintain and improve the productivity of the transportation system as a strategic competitive advantage than they were 10 or 20 years ago.

Like other states, Maine understands the importance of freight transportation to its social and economic well-being and has taken an active role in the incorporation of freight interests into its transportation planning program. Through this update to the Maine Integrated Freight Plan, Maine will continue its approach to freight planning, ensuring that efforts to improve the movement of freight into, out of, and within the State are continued.

■ ES.2 Project Approach

The overall project approach was to build upon the existing IFP, completed in 1998, to update data where appropriate, and to take the next step forward in statewide freight transportation planning. An effort was made not to duplicate work completed in the earlier IFP. The updated project included completion of several tasks, including:

- **Data collection**, which included the review of existing data sources and the purchase of commodity flow data for the State;
- **Data analysis**, which resulted in the development of Maine’s freight profile;
- **Public participation**, which included surveys and interviews with Maine-based businesses and focus groups conducted with Maine-based shippers, carriers, municipal officials, and the Freight Transportation Advisory Committee (FTAC);
- **Recommendations**, which identified freight trends and potential short- and long-term freight improvement projects; and
- **Preparation and distribution of the updated IFP.**

■ ES.3 Maine’s Freight Profile

Maine’s freight profile is based on an extensive data collection effort, which included a review of existing data, the purchase of county-level commodity flow data, distribution of mail-out surveys to selected manufacturers and municipality representatives, and the conduction of three focus groups with freight stakeholders. This data collection effort, in particular the participation of freight stakeholders through surveys, interviews, and focus groups, provided two important functions. First, it provided detailed information on the operations of shippers and carriers based in Maine, their perceptions on the strengths and weaknesses of the existing freight infrastructure, and their views on possible freight flow improvement projects. Second, these outreach activities illustrated MDOT’s commitment to involve freight stakeholders in the freight planning process, and worked to establish and expand relations between MDOT and private industries.

Maine's freight profile, described below, consists of a brief analysis of Maine's economy and demographics; a description of existing freight transportation infrastructure; an analysis of freight flows into, out of, through, and within the State; and the identification of key issues affecting freight transportation in Maine.

Economy/Demographics

Maine's unemployment levels, population levels, and job growth trends have generally mirrored regional and national trends, though at slightly slower paces.

- At 4.1 percent, unemployment rates in Maine remain approximately the same as the national average, but are slightly above the regional average;
- Job growth in Maine is below the U.S. average, but slightly above the regional average, led by strong growth in the service sector;
- Population growth in Maine is approximately the same as the regional average, but much slower than the national average;
- Maine's average wage is the lowest among the New England states and is only 81 percent of the national average; and
- Though manufacturing's share of employment within Maine dropped precipitously from 1980-1998, it has since leveled off, and manufacturing jobs within the State still pay higher, on average, than non-manufacturing jobs.

Though Maine is growing at a slower pace than the nation as a whole, these trends indicate that Maine took full advantage of the vibrant economy of the 1990s and should continue to maintain its position as a positive contributor to the regional, national, and international economy. Continued economic prosperity and growth will be dependent to a certain degree on Maine's ability to maintain and improve its transportation infrastructure.

Transportation Infrastructure

The transportation infrastructure in Maine continues to meet the needs of its businesses, but not without some inefficiencies, additional costs to shippers and receivers, and restricted modal selection. Maine's highway system is generally adequate, but like many northeastern states, some smaller highways pass through small community centers, and have narrow segments and steep inclines. Routes 9 and 11 were cited by many private sector freight stakeholders as being good examples of road improvements, and suggestions were made to improve additional highways, such as adding lanes on Routes 1, 2, 4, 25, 26, 27, 302, and the Maine Turnpike, in a similar manner. In addition, though highway access to the Ports of Portland and Searsport is good, landside access to the Port of Eastport is limited.

Freight railroads are classified as Class I, Regional, or Short Line. Class I railroads are those with annual revenues of greater than \$253.7 million. Examples of Class I railroads include Norfolk Southern and CSX. Regional and short line railroads are smaller companies serving specific regional and local markets. Maine is served by eight freight railroads, although the State's core rail system consists of Guilford, BAR, and SL&A. Class I

railroads have not operated in Maine for more than a decade. The regional railroads operating in Maine serve as gateways to the national networks of the remaining Class I railroads for long-haul movements. Maine shippers have direct access to CSX, NS, CP, and CN via Guilford and the SL&A. Some focus group participants indicated that high switchover costs often discourage use of the two Canadian railroads. Since there is no Class I service in Maine, Maine rail shippers must use multi-line rail service to reach distant markets. This type of service can be more expensive and less timely due to the cost and time associated with switching loads among different rail lines, when compared to a single railroad.

Maine's airport system consists primarily of municipal airports and two larger regional airports, Bangor and Portland. Freight movements by air account for less than 1.0 percent of the State's total freight flows by weight, though these movements generally consist of high-value/low-weight commodities, such as semiconductors or perishable food items. The majority of the air freight in Maine is handled by the Portland Jetport, the Bangor International Airport, and the Auburn-Lewiston Municipal Airport.

The Maine DOT developed a three-port strategy for concentrating investment in deep water port access in 1978. This three-port strategy was originally developed as an investment plan designed to allocate scarce resources to the port facilities with the highest potential for growth. The three ports designated for growth under this strategy are the Ports of Portland, Searsport, and Eastport. The Port of Portland is the State's sole container handling facility and the only other container handling facility in New England other than Boston. The Port of Searsport primarily handles bulk and break bulk commodities through the Sprague Energy Terminal at Mack Point, while the Port of Eastport handles primarily value-added forest products for Domtar. Maine's three-port strategy is focused on supporting the development of infrastructure improvements, including the

construction of piers and breakwaters; access improvements, including the dredging of channels and improving highway and rail access; and land improvements, including the purchase of land for port expansion.

While highway and rail access is generally good at the Ports of Portland and Searsport, highway access at the Port of Portland has been cited by some as inadequate. These inadequacies currently are being studied as part of the proposed connection of Interstate 295. Highway and rail access at the port of Eastport is limited; the closest railhead being located 17 miles inland. Though the port of Eastport enjoys the advantages of having a 64-foot natural channel and is the closest U.S. port to Europe, some believe its lack of inter-modal access prevents it from efficiently serving inland customers.

Freight Flows

A commodity flow analysis was performed, based on the TRANSEARCH commodity flow data purchased for the Maine DOT from Reebie Associates of Stamford, Connecticut. Both a base-year 1998 commodity flow dataset and a 2006 commodity flow forecast were purchased from Reebie. The 1998 dataset was the most current data available when this study commenced and combines existing proprietary, commercial, and publicly available data sources with economic forecasting techniques to show freight flows by weight into, out of, through, and within Maine. The 2006 commodity flow forecast dataset was developed by Reebie Associates based on an economics model built and maintained by WEFA, Inc. The commodity flow analysis yielded the following key findings about freight flows into, out of, and within Maine in 1998 and 2006:

- Nearly 102 million tons of freight were transported into, out of, and within Maine in 1998. Since 1991 there has been an increase of nearly 100 percent in domestic freight flows (52.8 million tons to 100 million tons).¹
- Intrastate movements represent the single largest type of movements, accounting for 64 percent of all freight flows in Maine (across all modes), as shown in Figure ES.1. This is expected to hold true in 2006. In fact, 69 percent of the total freight flows in Maine (across all modes) occur between points within the State (intrastate plus intra-county movements). Again, this is expected to remain constant through 2006.
- Unlike other northeastern states, Maine exports more freight (14.1 million tons in 1998) to other states than it receives (10.3 million tons in 1998). The relative shares of interstate imports and exports are expected to remain the same in 2006. This has led to the serious issue of “back-haul” costs for Maine shippers.
- Unlike interstate shipments, Maine imports more from Canada (4.7 million tons in 1998) than it exports to Canada (2.7 million tons in 1998). The relative shares of these movements also are expected to remain the same in 2006.

¹ This significant growth is based on the TRANSEARCH database, which was first purchased by MDOT in 1991 and has been purchased annually since 1995. It should be noted that this database is improved with each update. Therefore, the increase in tons is the result of growth in Maine freight flows in addition to improvements in the data.

- Freight shipments are forecast to grow at an overall pace of approximately 3.0 percent per year between 1998 and 2006. Canadian imports are expected to grow the most rapidly (3.20 percent annually), while the slowest growth rate is predicted for Canadian exports (2.56 percent annually). This may be due, in part, to the strength of the U.S. Dollar versus the Canadian Dollar over the last few years.
- Truck is the dominant mode of transportation for freight flows in Maine, representing 87 percent by weight in 1998, as shown in Figure ES.2. By 2006, truck's share is expected to decrease slightly to 86 percent, with that 1.0 percent of freight traffic shifting to rail.
- 95 percent of the intrastate and intracounty movements occur by truck. This is expected to remain constant through 2006.

Figure ES.1 Total Freight Flows in Maine by Type of Movement, 1998

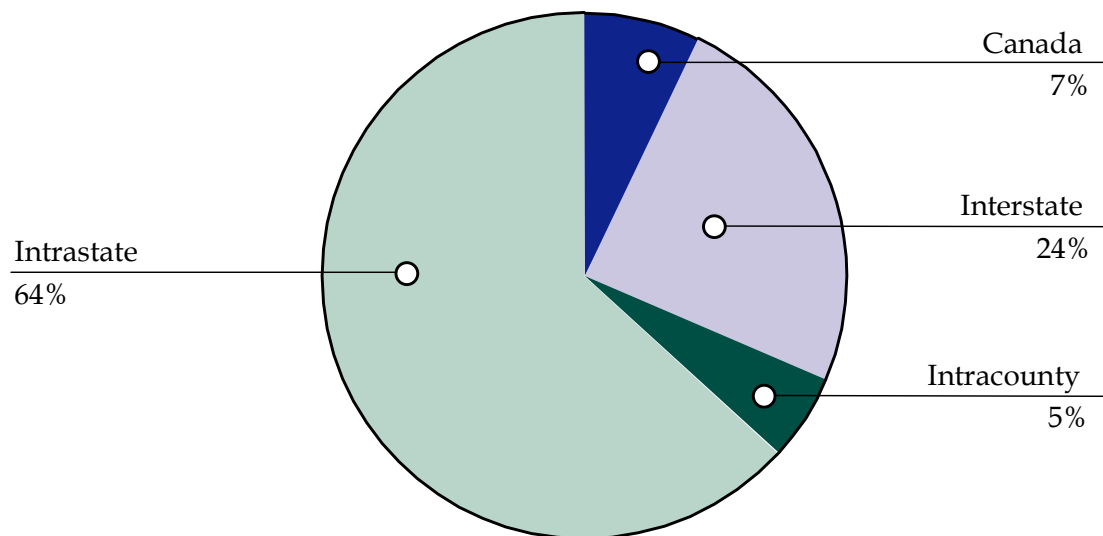
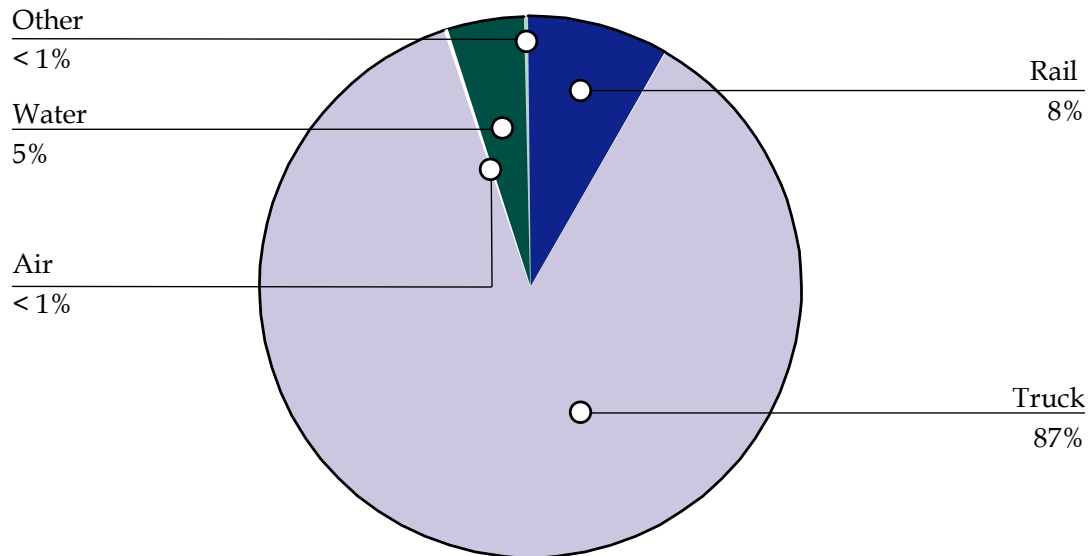


Figure ES.2 Mode Shares for All Movements within Maine, 1998

- The rail and water modes play a much larger role in interstate and Canadian shipments, particularly imports from these areas.
- The top commodity groups in 1998 consist of petroleum or coal products (42 percent); clay, concrete, glass, or stone (13 percent); lumber or wood products (excluding furniture) (11 percent); and pulp and paper products (11 percent) and account for 77 percent of the total flows, or 78.1 million tons. In 2006, the same four commodity groups are expected to account for 76 percent of the total flows, or 95.7 million tons. Again, these commodity groups consist of petroleum or coal products (41 percent); clay, concrete, glass, or stone (13 percent); lumber or wood products (excluding furniture) (11 percent); and pulp and paper products (11 percent).
- Food/kindred products and farm products are important exports to other states and Canada.
- Cumberland County is the key importing county in the State, receiving 12.9 million tons of freight in 1998. Cumberland County is expected to remain the top importing county in 2006. Penobscot County is the top exporting county in Maine, exporting 9.6 million tons of freight in 1998. This County is expected to lead the State in exports again in 2006.

Impact of Freight Value on Commodity Flows

The commodity flow analysis presented above reported Maine's commodity flow patterns based on weight. This is the fundamental approach to a freight study, as the weight of

commodities is important in understanding the ways in which freight vehicles are using the transportation system, by such measures as bridge stress and pavement consumption. Understanding how freight vehicles travel along Maine's transportation infrastructure is critical when addressing factors such as congestion, capacity, infrastructure investment, economic development, and quality of life. To gain a more holistic picture of the characteristics of freight movements within Maine, it is important to consider the value of the products being transported into, out of, and within the State. This is particularly important as heavy industry manufacturing has continued to decline nationally and regionally while being replaced by high-tech and service industries.

To illustrate the relationship between shipment volume and value, value per ton information from the U.S. Department of Transportation was used to compare the weight and values of commodities transported into, out of, and within Cumberland County. Cumberland County was chosen because of its diverse mix of commodity types and because it is the top importing county within the State, receiving 12.9 million tons of freight in 1998. As can be seen in Figure ES.3, there are several types of products that have an inverse relationship between their value and their overall tonnage. That is, as the volume of a commodity (represented by the bars) decreases, its value per ton (represented by the circles) generally increases. Equipment and machinery and consumer products, for instance, have relatively low shipment volumes, but very high values per ton.

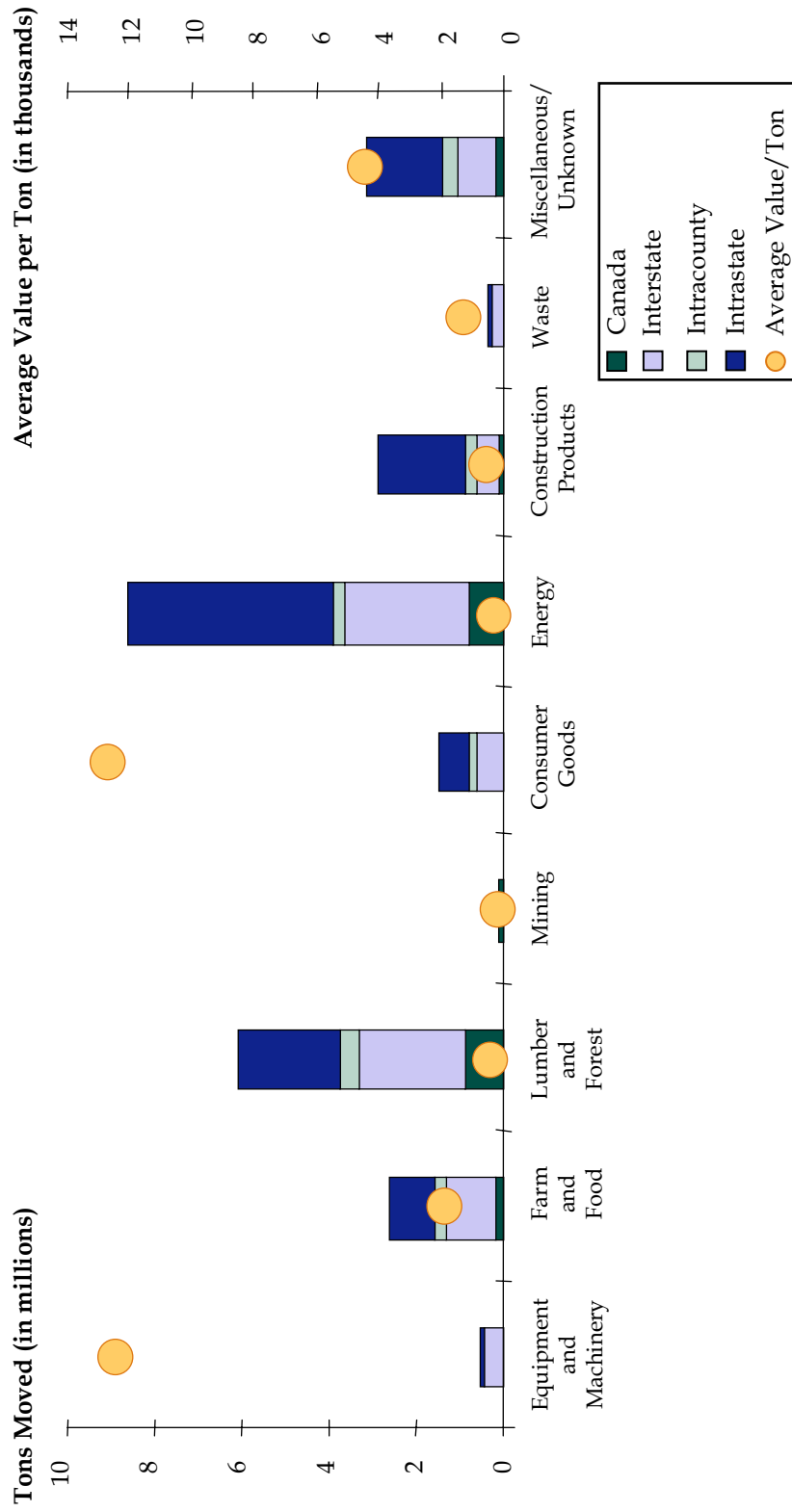
Conversely, energy products (including petroleum) and lumber and forest products, two of Maine's most important commodities, have very low values, but large shipment volumes. Comparing the weight and value of different commodities is important when determining the economic significance of certain flows to a region or state. Including value in a commodity flow analysis can highlight the importance of low-weight, high-value commodities to Maine's economy.

Institutional Issues

There are several institutional issues affecting freight transportation in Maine. These include specific issues, such as truck size and weight regulations, the rest area infrastructure, and the ability to identify back-haul loads for trucks. There are also larger, more generalized issues, including defining the appropriate role for Maine DOT in freight transportation planning, particularly in prioritizing and championing freight transportation investments.

Truck size and weight regulations. Many Maine-based shippers and carriers have expressed frustration with the disparity between Maine state truck weight limits and federal Interstate truck weight limits. Under existing federal regulations, trucks over 80,000 pounds are barred from traveling on the interstate highways. Maine regulations, in contrast, allow trucks operating off the Interstates to weigh up to 100,000 pounds. This

Figure ES.3 Comparison of Weight and Value by Commodity Type for Cumberland County, Maine



means that trucks over 80,000 pounds, to remain legal, must divert to state and local roads that often pass through town centers. This contributes to pavement consumption and raises safety concerns in the impacted communities. Another issue with some Maine shippers and carriers is the permit that Maine requires for the operation of trailers and semi-trailers between 48 and 53 feet long. These shippers and carriers feel that the permit creates an unnecessary administrative burden on motor carriers that is not imposed by other states. The congestion delays and administrative costs arising from these issues have an impact on the resources shippers and carriers must expend to transport freight in Maine.

Rest area infrastructure. Maine has a primarily rural highway system with generally widely scattered rest areas for commercial vehicles. The lack of rest areas suitable for trucks is quickly becoming a national issue, as well. These and other concerns are in the process of being addressed through the Maine Commercial Vehicle Service Plan, designed to help the State identify ways to prevent driver fatigue through the construction, operation, and maintenance of commercial vehicle facilities.

Rail service. Many Maine-based shippers are concerned with the lack of adequate and consistent rail service within the State. Though Maine is served by six railroad companies, many Maine businesses do not have easy access to their services. This is the result of abandoned rail sidings and short lines, and lack of interest by the railroads in providing specific shippers with rail service. Further hindering efficient rail service in Maine is the fact that height and weight restrictions prevent the statewide operation of 286,000-pound rail cars and double-stack service in some areas. While some of Maine's regional and short line railroads may have the ability to safely handle 286,000-pound cars and double-stack service is provided along some corridors, there is no current strategy to address these and other rail infrastructure issues at a statewide level.

Back-haul loads. As Maine produces more goods than it consumes, there are a significant amount of "deadhead" miles being traveled on Maine's transportation network. "Deadhead" miles are those miles traveled by freight trucks not carrying payloads. After delivering loads to non-Maine destinations, many Maine-based carriers are forced to return to Maine empty-handed. The fuel, insurance, and driver costs accrued during these empty return trips are not off-set with delivery fees, eventually increasing transportation costs for Maine's shippers, carriers, and consumers. Advancements in technology, however, are anticipated to provide new tools for use by Maine businesses in managing their transportation and distribution functions while making these functions more efficient. Such advancements, including the use of the Internet to provide load-matching services and identify back hauls, may provide Maine businesses the opportunity to improve their efficiency and lower their overall freight transportation costs.

Maine DOT freight planning program. Maine DOT has included freight transportation interests into its general transportation planning process. The impending completion of the Heavy-Haul Truck Network Study is one example of how MDOT is attempting to further improve its freight planning capabilities. Unlike passenger transportation, which can often be thought of as a public service, freight transportation is strongly affected by market forces; a statement echoed by many private sector freight stakeholders. One of Maine DOT's challenges in developing a statewide freight program is balancing the

concerns of the private sector, who often worry about regulatory issues and perceived modal biases, with the economic development, multimodal efficiency, and safety goals of the public sector.

■ ES.4 Recommendations

The recommendations proposed in this update to the IFP are designed to build upon and complement the recommendations provided in the original IFP. The recommendations in this report generally serve one of five functions that represent the core elements of freight planning identified for the state of Maine:

- Enhancing connections between the current modal networks to improve the functioning of the overall freight transportation system;
- Improving the efficiency of freight operations throughout the State through the use of new and improved technologies;
- Understanding the current and future freight transportation issues through the continued interaction among MDOT, private sector freight stakeholders, regional economic development interests, and the general public;
- Improving access to all modes of freight transportation, offering Maine businesses the opportunity to make shipment decisions based on individual commodity characteristics rather than being limited to a single mode; and
- Improving the quality and level of service of the existing freight transportation system, thereby increasing the array of transportation options available to regional freight shippers.

The recommendations in this report are grouped into one of three categories:

- **Infrastructure recommendations** are freight improvement projects that will expand or physically enhance the State's transportation infrastructure;
- **Policy strategies** seek to optimize governmental regulations or incentives to better manage freight traffic on the existing transportation network; and
- **Operational improvements/technology** use new paradigms in fleet management, low-capital network improvements, and emerging transportation technology to maximize the capacity and level of service provided by the State's transportation network.

Following these lists of recommendations, a list of proposed freight improvement projects identified by the focus groups and shipper carrier surveys is provided. These projects also are categorized into infrastructure improvements, policy strategies, and operational improvements/technology.

Infrastructure Recommendations

Short Term

- **Work with private sector stakeholders to identify “quick-fix” projects.** “Quick-fix” projects are normally small, easily implementable projects, such as signal timing or signage improvements or even pothole repairs, that can be accomplished quickly and with little funding.
- **Continue to address the issue of adequate rest areas and other safety concerns.** These and other concerns are in the process of being addressed through the Maine Commercial Vehicle Service Plan, designed to help the State identify ways to prevent driver fatigue through the construction, operation, and maintenance of commercial vehicle facilities.

Long Term

- **Consider making improvements to key Maine highway corridors using the improvements to Route 9 as a guide.** To improve truck operations within the state, MDOT should consider making similar improvements to U.S. Routes 1, 2, and 302, State Routes 4, 25, and 26, and other major truck routes identified in Maine’s ongoing Heavy-Haul Truck Network Study.
- **Focus port development activities on enhancing modal connections.** MDOT should consider focusing future port development efforts on improving modal connections to and from the Ports of Portland, Eastport, and Searsport and other ports, if necessary.
- **Focus attention and resources on the issue of security along Maine’s freight transportation system.** Due to the recent terrorist attacks, MDOT will need to work with private operators to ensure that all facilities and infrastructure components are as safe as possible from future incidents.

Policy Strategies

Short Term

- **Continue to investigate highway projects and initiatives that improve the flow of freight into, out of, within, and through the State.** Since the publication of the original IFP, Maine DOT has undertaken a number of projects and studies, such as the I-395 Extension Study, the Wiscasset Route 1 Corridor Study, and the Portland I-295 Connector Study. As freight movements in Maine are highly dependent on the truck mode, MDOT should continue to consider these and other highway projects and initiatives as part of their transportation planning program.
- **Continue freight education and outreach efforts.** MDOT should continue to educate decision-makers and the general public on the importance of freight transportation and its role in maintaining Maine’s economic vitality.
- **Develop an informational guide to MDOT freight planning activities.** To better explain its involvement in freight-related issues and to garner support for its freight

planning program, MDOT should develop an informational guide to its freight planning activities.

- **Maintain relationships with private sector freight stakeholders.** MDOT should continue to engage private sector freight stakeholders to ensure their understanding of and participation in the statewide freight planning process.
- **Develop two-way communication protocol on the Maine OFT web site.** Maine DOT should consider developing a more formal communications protocol on its web site through the development of an electronic dialogue feature. Such a dialogue would allow web site users to provide feedback, ask specific questions, and generate discussion among MDOT personnel and other web site users through the electronic posting of discussion threads.
- **Coordinate transportation planning activities with the efforts of Department of Economic and Community Development.** MDOT should consider developing a program to coordinate the efforts of the Department of Economic and Community Development (DECD) with its freight transportation planning activities to ensure that transportation improvements are considered during economic development activities, and vice versa.
- **Continue to fund the Industrial Rail Access Program (IRAP).** MDOT should continue to identify specific rail needs and provide funding assistance to ensure that rail infrastructure remains able to compete effectively with the highway mode. Projects funded under IRAP have included new rail sidings, switches, and track upgrades.
- **Continue to fund the Small Harbor Improvement Program (SHIP).** MDOT should continue to work with the Department of Economic and Community Development and the Department of Conservation's Boating Facilities Division to identify and fund worthwhile projects that improve marine freight operations in areas not included in the existing three-port strategy.
- **Use results of the Heavy-Haul Truck Route Network Study to identify potential freight transportation improvement projects.** Working with the FTAC, MDOT should immediately use the results of the study to identify and prioritize freight transportation improvement projects for inclusion in the next update of the State Transportation Improvement Program (STIP).
- **Continue the Access Management Program.** MDOT's Access Management Program is designed to conserve state highway investment, manage highway capacity, and maintain rural arterial speeds and also can benefit freight movements by limiting the

entry and exit points to and from main streams of traffic. MDOT should continue to implement this program and may wish to solicit feedback on the program's effectiveness through its freight community outreach efforts.

- **Develop a strategy to improve intermodal access to the port of Eastport.** MDOT should assemble a focus group of shippers, carriers, railroads, members of the Eastport Port Authority, and other local stakeholders to develop a strategy to address this problem.
- **Encourage Maine MPOs to include private sector freight representatives on their planning committees.** To ensure that private sector freight stakeholders can provide input throughout the transportation planning process, MDOT should encourage Maine's MPOs to include private sector representation on their planning committees. Including private sector freight representatives in the metropolitan transportation decision-making process will allow MPOs to better understand the freight transportation issues in their areas and allow them to develop strategies to address those issues while fostering a sense of cooperation between the public and private sector.
- **Continue purchasing commodity flow data every year.** MDOT should continue purchasing data showing total freight movements into, out of, and within Maine on an annual basis in order to maintain an effective statewide freight planning program. This data is one-of-a-kind and otherwise difficult to gather.

Long Term

- **Continue freight data collection efforts.** MDOT should continue to collect freight data, possibly by developing a small (one-page) survey for shippers and carriers with which to determine freight trends. These efforts could be supplemented periodically (no more than every three years) by a more extensive data collection effort, including the purchase of detailed commodity flow and origin-destination data to more precisely determine freight patterns into, out of, and within the State.
- **Encourage Congress to address Interstate truck weight limits.** MDOT should work with the Maine congressional delegation existing federal regulation that prohibits trucks over 80,000 pounds from operating on Maine's interstate highways.
- **Study trailer size limits.** MDOT should conduct a study to determine the costs and benefits of allowing 53-foot trailers to operate within the State without a special permit.
- **Readdress existing three-port strategy.** To improve the operations of the State's overall marine system, MDOT should consider readdressing or supplementing its three-port strategy to include other marine ports in addition to Portland, Searsport, and Eastport.
- **Develop a strategy to address freight rail height and weight restrictions.** While some of Maine's regional railroads may have the ability to safely handle 286,000-pound cars and double-stack service is provided along some corridors, height and weight restrictions prevent the operation of these trains statewide. MDOT should

work with the railroads operating in Maine to develop a strategy to address existing statewide rail height and weight restrictions.

- **Develop a strategy for future MDOT investment in railroad infrastructure.** MDOT's rail infrastructure investment strategy should be designed to improve rail competition to the point where rail can become a viable transportation mode for more Maine-based shippers.
- **Consider trade corridors during freight planning efforts.** MDOT should continue its active involvement in regional freight studies conducted by the Eastern Border Transportation Coalition (EBTC) and the I-95 Corridor Coalition and may wish to consider conducting its own analysis to identify its major trading partners. Such an analysis would require the collection of detailed origin-destination data, either through intercept surveys along major trade routes or the purchase of Reebie TRANSEARCH origin-destination data for freight movements into, out of, and within the State.

Operational/Technology Improvements

Short Term

- Investigate the use of Internet-based technologies to improve freight transportation efficiency and lower overall freight transportation costs. The Internet has changed the way information is managed, particularly in the trucking industry, where it facilitates the flow of information between shippers, carriers, freight forwarders, and even governmental regulatory agencies. There are several areas in which the increased use of the Internet may improve the efficiency of freight movements within Maine, resulting in lower overall transportation costs for Maine businesses.
 - The first of these areas is empty backhauls. As Maine exports more goods than it imports, there are a significant amount of “empty miles” being traveled on Maine's transportation network, increasing transportation costs for shippers, carriers, and consumers. The Internet is a useful tool in identifying backhaul loads, thus preventing “deadhead” mileage and improving operational efficiency. Another such issue is online permitting.
 - The Internet has proven to be an effective medium through which to issue and track permits for oversize and overweight vehicles. Issuing and tracking such permits electronically expedites the application and approval process and can minimize delays to oversize or overweight shipments.
 - MDOT has begun to define the role of the Internet in its freight transportation planning activities, even raising the possibility of providing load-match information on its own website. Though this suggestion was met with mixed reviews

during the outreach efforts conducted over the course of this project, MDOT should continue to incorporate the use of Internet technologies into its freight program where deemed appropriate by MDOT and the Maine shipping community.

- **Expedite improvements to the Kittery-York Weigh Stations.** MDOT plans to install in-ground truck weigh scales at both the northbound and southbound I-95 commercial vehicle enforcement areas in Kittery and York. As part of this project, the Department also will install an additional storage lane at each site for trucks waiting to pass enforcement checks. These improvements will speed up vehicle weighings, reduce the need for station closings due to truck backups, and pave the way for further automation projects at the two facilities. MDOT will be exploring various carrier pre-clearance programs that would allow vehicles with clean records to legally bypass enforcement details at the Kittery-York weigh stations.

Long Term

- **Continue to employ ITS technologies to improve commercial vehicle operations.** Through its ITS/CVO Working Group, MDOT should continue to monitor advances in transportation technology and investigate ways to adapt that technology to benefit freight movements into, out of, and within the State. Potential ITS applications that may benefit freight movements within Maine include:
 - The use of weigh-in-motion (WIM) technology to replace traditional commercial vehicle weigh stations. The use of WIM would eliminate the need for trucks to stop at these weigh stations, improving the flow of freight throughout the State;
 - The use of laptops by CVO inspection personnel to facilitate processing of inspection reports and improve the ability to pre-screen truckers using national databases;
 - The development of an automated oversize/overweight routing and permitting program to streamline the current process for routing and permitting large trucks within the State; and
 - The integration of existing traveler information systems that provide traffic flow information, with information systems in use at ports and intermodal facilities that can provide information on vessel arrival and container availability. The integration of these two types of systems, such as the Port Authority of New York and New Jersey's Freight Information Real Time System for Transport (FIRST), can improve traffic flow near ports and intermodal terminals.

1.0 Introduction and Background

The Maine Department of Transportation (MDOT), like its many counterparts across the country, recognizes the increasingly important role played by freight transportation in the management and growth of its region's overall transportation infrastructure, and in the promotion of Maine's economic vitality. The MDOT's Office of Freight Transportation has worked for improved consideration and advancement of freight improvement projects and has taken several significant steps in expanding its freight transportation planning activities, beginning with the completion of the first Integrated Freight Plan (IFP) in 1998. That plan summarized the freight system in Maine, how it was being used, what its key issues were, and recommended strategies for its improvement.

In an effort to continue its approach to addressing freight transportation within the State, the Maine DOT has initiated a project to update the original Integrated Freight Plan (IFP) and to help create a more advanced, state-of-the-art freight program for the State. The goals of this updated IFP are to:

- Develop an updated freight profile for Maine reflecting changes to the freight transportation system and the evolution of the freight industry;
- Build relationships with and identify the concerns of public and private freight stakeholders in the State;
- Document the progress and lessons learned since the completion of the original IFP in 1998; and
- Recommend specific freight improvement projects and changes to Maine's freight planning program.

■ 1.1 Importance of Freight Transportation and Examples of Its Consideration by Other State DOTs

In the Intermodal Surface Transportation Efficiency Act (ISTEA, enacted 1991) and the Transportation Efficiency Act for the 21st Century (TEA-21, enacted 1998), Congress encouraged the consideration of freight during statewide and metropolitan transportation planning processes. Congress emphasized the importance of freight movements because it had seen the impressive improvements in carrier productivity that resulted from deregulation of the freight transportation industry in the late 1970s and early 1980s and understood the opportunities that a cost-efficient and competitive transportation system created for trade and economic development. Deregulation had freed the freight transportation industry from most modal and jurisdictional barriers resulting in the creation of new, innovative

services and increased productivity. By encouraging cross-modal coordination, Congress hoped to catalyze another advance in national freight productivity.

Freight was included among the planning factors in TEA-21, which helped focus federal, state, and MPO attention to freight issues. There is a growing awareness at the state level of the importance of freight transportation and a corresponding push to link state and local transportation investment, especially freight transportation investment, to economic development. Adequate transportation is considered to be one of several site location requirements and key factors (e.g., utilities, work-force skills, and tax structure) that affect a state's business costs, markets, and overall competitiveness for attracting business investment. Essentially, all businesses require some level of transportation access to labor, materials, and customers in order to operate and survive. As such, transportation is a factor that influences the outcomes which local and regional economic development agencies are seeking to achieve – increasing their areas' business attractions, expansions, retentions, and startups. As a result, state DOTs and business leaders are much more mindful today of the need to maintain and improve the productivity of the transportation system as a strategic competitive advantage than they were 10 or 20 years ago.

The inclusion of freight interests into an existing transportation planning program often presents significant challenges to state DOTs for several reasons. First, DOT staff often do not have formal training in freight transportation, making it difficult to fully appreciate freight's sometimes unique issues. Next, though private sector freight stakeholders can often provide the expertise necessary to conduct successful statewide freight planning, building and maintaining relationships with the private sector is often difficult for some state DOTs. Third, freight movements and the factors that affect them are not yet fully understood, complicating efforts to develop statewide transportation models that accurately reflect freight movements. Finally, the traditional transportation planning and programming process employed by many states to initiate, evaluate, approve, fund, and implement transportation improvement projects is sometimes inhospitable to projects that specifically benefit freight movement. As a result, the full incorporation of freight interests sometimes requires innovative thinking by state DOTs, particularly in the areas of staffing, private sector involvement, transportation modeling, and the planning and programming process. In addition to the Maine DOT, several other state DOTs, including New York, Oregon, Florida, Minnesota, and Washington, as well as the Federal Highway Administration (FHWA) have employed innovative methods to more fully integrate freight movements into their transportation improvement programs.

Prior to 1996, MDOT maintained individual modal divisions for water, rail, highway, mass transit, and air transportation. In the spring of 1996, however, these modal divisions were dissolved, and planning and programming responsibilities were divided between the newly formed Offices of Freight and Passenger Transportation. The Office of Freight Transportation was charged with developing a free-flowing intermodal freight network that would offer Maine shippers greater choice among modes, increased productivity, environmental benefits and reduced transportation costs. Under this new model, more synergy among different modal planning and project development has taken place and freight transportation issues can be more clearly addressed.

State DOT staff are an important resource in identifying potential freight improvement projects and moving those projects through the general transportation planning process. Maintaining a dedicated freight planning staff within a state DOT that is able to focus on freight issues, problems, and concerns, is often the first step toward successful statewide freight planning. The New York State DOT (NYSDOT), recognizing the link between freight transportation and economic development, maintains a permanent staff in its Freight and Economic Development Division (FEDD) of the Office of Passenger and Freight Transportation. The FEDD is responsible for freight policy development and transportation-related economic development projects. The Oregon DOT (ODOT) also maintains a permanent intermodal freight planning staff member within the Transportation Planning Section of its Transportation Development Division.

The private sector freight community can provide the background, training, and expertise necessary to more fully address freight in the statewide transportation planning processes. Private sector participation is often achieved through a freight advisory committee, made up of public and private freight stakeholders, that can identify freight transportation problems as well as strategies to address those problems. The state of Oregon has been a leader in fostering private sector involvement via a freight advisory committee. Oregon's freight advisory committee was formed in 1998 at the direction of the ODOT Director. Though originally formed as an informal advisory group, the freight advisory committee gained new stature in 2001 when the Oregon State Legislature specifically tasked the group with identifying freight improvement projects of statewide and regional significance. The Maine DOT also maintains strong relationships with private sector freight stakeholders. Through its Freight Transportation Advisory Committee (FTAC), the Maine DOT is actively engaging the private sector in its freight transportation planning process. Though private sector involvement is sometimes hampered by the considerable time investment required to become full participants in the public planning process and the differences between the public and private planning horizons, active private sector participation is a crucial element of a successful statewide freight planning program.

Unlike passenger movements, the underlying factors driving freight shipment patterns and mode choice vary considerably across different industries, commodities, and regions. These factors are less readily understood than the factors that affect passenger travel. As a consequence, many states find it difficult to adapt traditional automobile and transit modeling techniques to predict freight movements. The state of Florida, however, has initiated the development of a commodity-based freight model that will assist planners in forecasting future commodity movements throughout the State. In addition, Vermont, a state heavily dependent on truck movements, recently developed a truck-to-rail diversion model to determine the commodities and corridors with the highest potential for diversion to rail.

Finally, most freight improvement projects are evaluated for inclusion in state transportation improvement programs using the same set of criteria that are used for evaluating non-freight improvement projects. These criteria typically consider how a proposed project will improve highway volume-to-capacity ratios, highway level-of-service ratings, and safety. Some freight improvement projects receive adequate scores for these criteria, but most fail because, for example, a freight connector improvement project typically serves fewer total

vehicles than a competing suburban intersection improvement. Missing are evaluation criteria that reflect the other economic and business development benefits of freight improvement projects such as how they may improve shipping-time reliability or the extent to which they may attract or retain businesses and jobs in an area. The Washington State DOT (WSDOT) has taken a unique approach to address these issues through its Freight Mobility Strategic Investment Board (FMSIB). The FMSIB is an independent state agency that evaluates, ranks, and recommends freight improvement projects to the state legislature for funding. Each year, potential freight projects of statewide significance are evaluated using a set of freight-specific criteria and are ranked without regard to jurisdictional ownership. The result is that freight improvement projects of statewide significance do not have to compete with passenger or transit improvement projects for already scarce funding, giving freight projects a fighting chance for implementation.

Like these other states, Maine understands the importance of freight transportation to its social and economic well-being and has taken an active role in the incorporation of freight interests into its transportation planning program. Through this update to the Maine Integrated Freight Plan, Maine will continue its approach to freight planning, ensuring that efforts to improve the movement of freight into, out of, and within the State are continued.

In defining the goals of freight transportation planning, it is critical to understand the strengths of each mode. This is especially important because of the expectations placed on freight transportation programs. Often freight studies are motivated by the public desire to reduce truck traffic. As a result, many planning agencies that undertake freight studies are expected to shift significant amounts of freight volumes from trucks to rail to achieve a more equal balance across modes. In most cases, this is impossible to achieve because modal decisions are made based on customer demands (cost, reliability, on-time delivery, type of product, etc.). Some shippers specifically define how their products shall move. The more appropriate goal for freight transportation planning is to develop a program that assists each mode achieve its maximum efficiencies, allowing carriers to effectively compete for traffic. This approach works to strengthen each modal system while preserving the market driven environment. For example, if a large manufacturer would like to use rail but does not have access to a rail line, the state could assist in the construction of a rail siding or in identifying possible alternate plant sites. The goal is to determine whether or not there are investment opportunities that the state could undertake to solve bottlenecks currently limiting a carrier's ability to provide competitive service.

■ 1.2 Organization of Report

This report is organized as follows:

- **Section 1.0, Introduction and Background.** This section defines the goals of the IFP update project, discusses the importance of freight transportation, and provides an overview of how state DOTs have considered freight transportation issues.

- **Section 2.0, Project Approach.** This section discusses the technical approach and tasks taken to accomplish the plan update.
- **Section 3.0, Maine's Freight Profile.** This section presents a freight profile for Maine, including a summary of the results of the stakeholder participation process, a discussion of the economic trends and forecasts for the state, descriptions of the various freight transportation modes and how they have changed since the original IFP, and the role of the Internet in freight transportation.
- **Section 4.0, Commodity Flow Patterns.** This section provides an analysis of the State's current and future commodity flow patterns by identifying Maine's top commodities, analyzing mode shares for freight movements into, out of, and within the State, and describing the effect of freight value on commodity flows.
- **Section 5.0, Findings, Conclusions, and Recommendations.** This section summarizes the findings from all the analyses and provides conclusions and recommendations for future freight planning efforts in Maine.

2.0 Project Approach

This project updates the first Integrated Freight Plan (IFP) completed in 1998. The overall project approach was to build upon the existing IFP, to update data where appropriate, and to take the next step forward in statewide freight transportation planning. An effort was made not to duplicate work completed in the earlier IFP. The updated project included completion of five separate tasks: data collection, data analysis, public participation, development of recommendations, and preparation of the IFP. Figure 2.1 illustrates the major activities completed under each task. (Appendix A provides a more detailed description of the project approach.)

■ 2.1 Data Collection

Data collection was a key component of this effort because, through this activity, MDOT could begin to measure and evaluate which characteristics of the freight system that had changed since completion of the initial IFP. This was the first opportunity for OFT to review its first freight transportation planning effort and determine what worked well, what needed to be changed, and where the program ought to be headed. A primary data collection activity focused around collecting information from shippers, receivers, and carriers. A second activity focused on the acquisition of more geographically disaggregated commodity flow data than had been used in the past.

The specific data collection activities were as follows:

- Identify and gather existing data and reports describing the state's freight transportation system.
- Develop and distribute mail-out surveys and personal interview forms to collect data and input from Maine shippers/receivers, carriers, and municipalities. Appendix B provides the survey and interview tools.
- Purchase county-level commodity flow data from Reebie Associates.
- Complete Internet-based search for load-matching services (to assist with the backhaul issues in Maine).

Figure 2.1 Technical Approach

Task 1 Data Collection	Task 2 Data Analysis	Task 3 Public Participation	Task 4 Recommendations	Task 5 Prepare Final Report
<ol style="list-style-type: none"> 1. Identify and collect existing data and reports 2. Review and update 1998 survey instruments 3. Administer surveys/interviews 4. Collect existing freight flow data 	<ol style="list-style-type: none"> 1. Analyze new survey/interview data 2. Compare new survey data to 1998 data 3. Develop freight flow trends 4. Develop economic trends 5. Develop forecasts for Maine's top industries over the next 20 years 6. Identify and analyze the impact and opportunities of advancements in technology 7. Identify key freight issues (technology, logistics trends, small package industry, border crossing, etc.) 	<ol style="list-style-type: none"> 1. Outreach activities conducted in coordination with the survey/interview processes 2. Organize and run up to three focus groups for Maine's freight stakeholders 3. Ensure regular communication between OFT staff and CS team project staff 	<ol style="list-style-type: none"> 1. Summarize data and analyses 2. Identify key freight trends 3. Identify key opportunities 4. Develop recommendations for short-term and long-term freight projects 	<ol style="list-style-type: none"> 1. Prepare initial draft final report 2. Prepare draft final report 3. Prepare final report 4. Present final report

■ 2.2 Data Analysis

Data collected in the data collection step were analyzed in order to develop a comprehensive description of the freight transportation system in Maine. This included looking at operational characteristics, defining commodity flow movements, and identifying institutional issues. Specific activities of this task included analysis of:

- Web-based literature search conducted by OFT;
- Mail-out survey and personal interview databases;
- Base and future TRANSEARCH commodity flow databases;
- Economic and demographic data;
- Freight infrastructure logistics patterns for Maine shippers;
- Web-based load matching services data; and
- Key freight issues.

■ 2.3 Public Participation

Public participation ensured that key freight stakeholders had an opportunity to provide input to the IFP update. This task consisted of the following activities:

- A coordinated effort was made to describe the freight plan goals in the mail-out surveys and the personal interview process;
- Three focus groups were held with shippers/receivers, carriers, and government/lobbyists;
- The FTAC functioned as an advisory body for the project; and
- The updated IFP will be made available through presentations and OFT's new freight web page following completion.

■ 2.4 Develop Recommendations

The final technical component of the IFP update process was to develop findings and conclusions from the above analyses and make recommendations to address the identified freight bottlenecks. Short- and long-term projects and policies were identified to improve the freight transportation system in Maine, and a set of next steps were developed to

guide OFT's future freight planning program. The recommendations proposed in this update to the IFP are designed to build upon and complement the recommendations provided in the original IFP.

■ 2.5 Prepare the Updated Maine Integrated Freight Plan

The objective of this task was to document the findings of the IFP update process and to produce an updated IFP. The effect of freight flows and projected economic growth on transportation infrastructure and service options was considered in the preparation of an initial draft IFP. The plan documents the work steps necessary to complete the plan and provides a set of recommendations for the OFT and the local freight stakeholders. Specific activities included are as follows:

- In consultation with the OFT, an outline for the updated IFP was developed.
- The initial draft final plan was prepared documenting the findings of the study.
- Comments received from OFT staff were incorporated into the initial draft final plan to prepare the draft final plan.
- The draft final plan was distributed to key stakeholders, including members of the FTAC, for comment. These comments were incorporated based on consultation with OFT staff to prepare the final plan and Executive Summary.
- The final updated IFP and Executive Summary were delivered to MDOT and made available to the public through the MDOT's Office of Freight Transportation web page (<http://www.state.me.us/mdot/freight/homepage.htm>).

3.0 Maine's Freight Profile

As defined in Section 2.0, an extensive data collection effort was undertaken in the preparation of the update to the Maine Integrated Freight Plan. This included a review of existing data, the purchase of county-level commodity flow data, distribution of mail-out surveys to selected manufacturers and municipality representatives, and the conduction of three focus groups with freight stakeholders. The data collected through these efforts were analyzed and used in the development of a freight profile for the state of Maine.

The outreach efforts conducted during this IFP update, particularly the shipper/receiver mail-out surveys and personal interviews, included a number of open-ended questions that elicited a wide range of responses. Such open-ended questions are useful in providing respondents an open forum in which to address and expand on their concerns, but because these answers are often not easily quantifiable, it sometimes limits the range of statistical analyses that can be performed on the results. However, the survey and interview responses did lend themselves to some statistical analysis that revealed several interesting points about how Maine businesses move freight. In order to expand the sample on which to perform these analyses, the results of the shipper/receiver mail-out surveys and the interview responses were grouped together for analysis. The following section provides a summary of the data used to develop this profile. Additional data analysis is provided in appendices, as referenced throughout this section.

■ 3.1 Results of Stakeholder Participation

Stakeholder participation was a critical component of the development of the IFP update. It provided two important functions. First, it served as the key data collection source, providing detailed information on the operations of shippers and carriers based in Maine, their perceptions on the strengths and weaknesses of the existing freight infrastructure, and their views on possible freight flow improvement projects. Second, the outreach activities illustrated MDOT's commitment to involve freight stakeholders in the freight planning process, and worked to establish and expand relations between MDOT and private industries. The following summarizes the results of the mail-out surveys, personal interviews, and focus groups.

Mail-out Surveys and Personal Interviews

The mail-out survey analysis conducted in the 1998 IFP concentrated on the largest 340 manufacturers in Maine, based on company size. In this update, however, both large and

small Maine-based companies were targeted. Of the 600 surveys sent out, 169 were returned. This 28 percent return rate is considered excellent for this type of data collection activity. Completed surveys were received from all areas in Maine, as illustrated in Figure 3.1. Figure 3.2 shows the total number of survey respondents by company size. Of the total number of respondents, over half employ fewer than 50 people.

Figure 3.3 shows the percentage of respondents by their “degree of multimodalism.” In 1998, slightly fewer than 50 percent of survey respondents reported using trucks as their sole means of freight transportation. In this IFP update, however, the vast majority of respondents indicated that goods are shipped solely by truck; this is particularly true for businesses whose freight movements mainly occur between points within Maine. The difference between the 1998 and 2001 survey results may be attributed to the respondents themselves. As discussed above, the 1998 surveys were focused on larger manufacturers whose large shipment volumes could have enjoyed the economies of scale offered by rail or water transportation. Conversely, over half the respondents in this IFP update employ fewer than 50 people and may only ship small volumes of freight that are most economically transported by trucks. While several respondents indicated that they use more than one mode of transportation to ship or receive freight, only 10 respondents suggested that they use more than two modes.

Ranking of Improvement Activities

One of the final sections of the mail-out survey and the private sector interviews asked respondents to rate the following potential improvement activities based on their importance (1 = least important, 5 = most important):

- Upgrade highways and bridges;
- Improve or expand rail/truck intermodal facilities;
- Improve or expand existing rail service;
- Upgrade existing port facilities;
- Improve or expand existing air freight services;
- Change truck size and weight policy; and
- Change road postings.

Figure 3.4 shows the average scores for each improvement type for all survey and interview participants. As can be seen, Maine businesses consider the upgrading of highways and bridges, the changing of truck size and weight requirements, and the changing of road postings to be the most important types of improvements. These results are similar to the results obtained in Maine’s 1998 Integrated Freight Plan, in which survey respondents also ranked highway improvements, truck size and weight requirements, and road posting improvements as the three most important types of improvements.

Figure 3.1 Location of Survey and Interview Respondents



Figure 3.2 Number of Private Sector Survey and Interview Respondents by Company Size

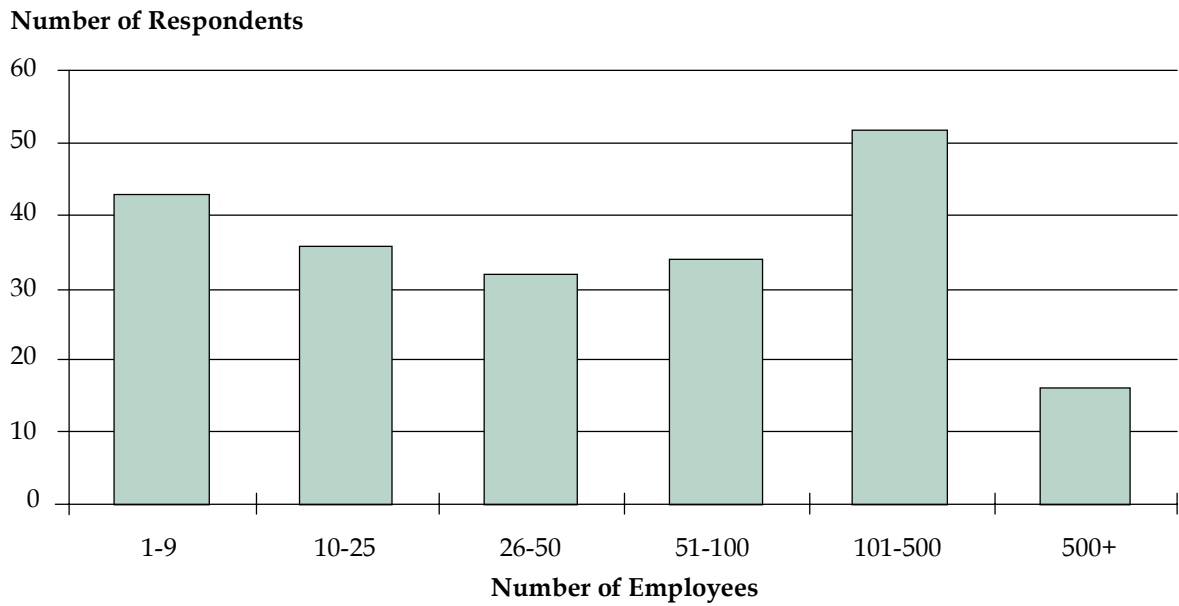


Figure 3.3 Private Sector Survey and Interview Respondents Degree of Multimodalism

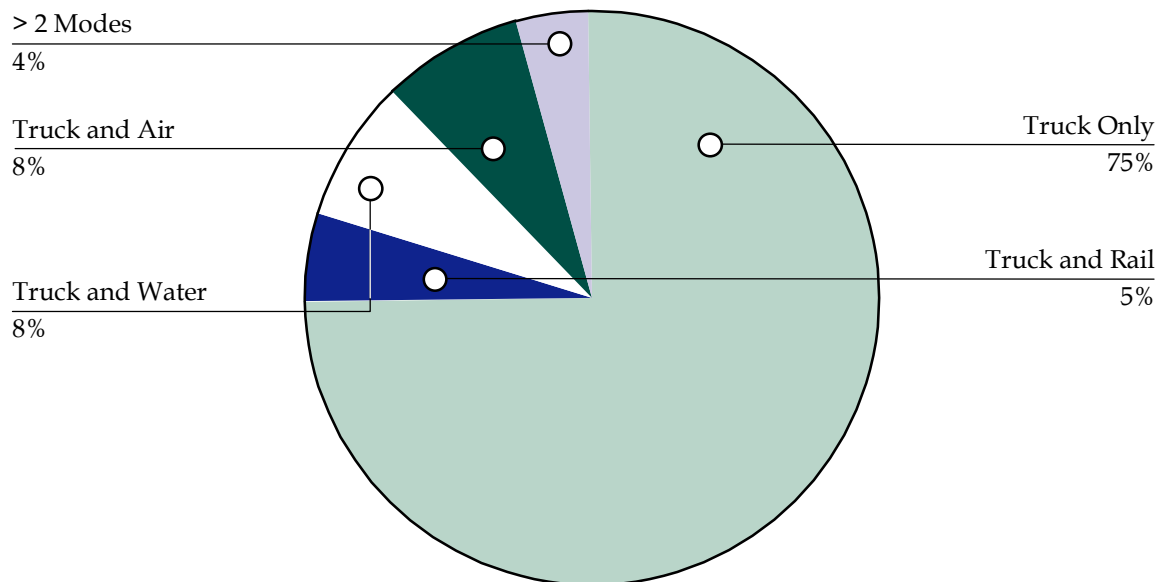
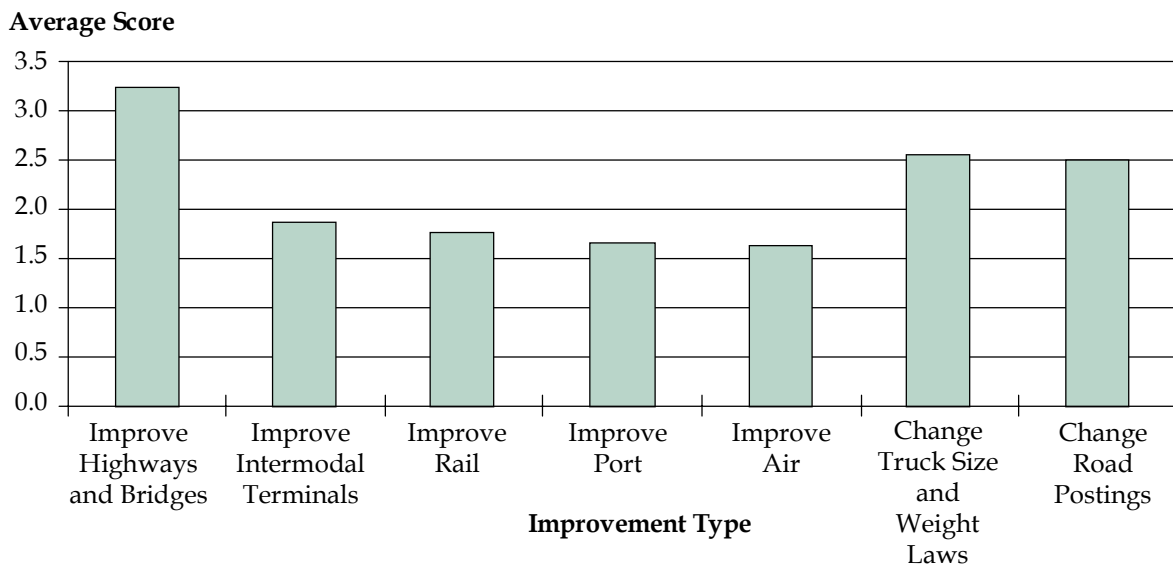


Figure 3.4 Average Scores, All Respondents

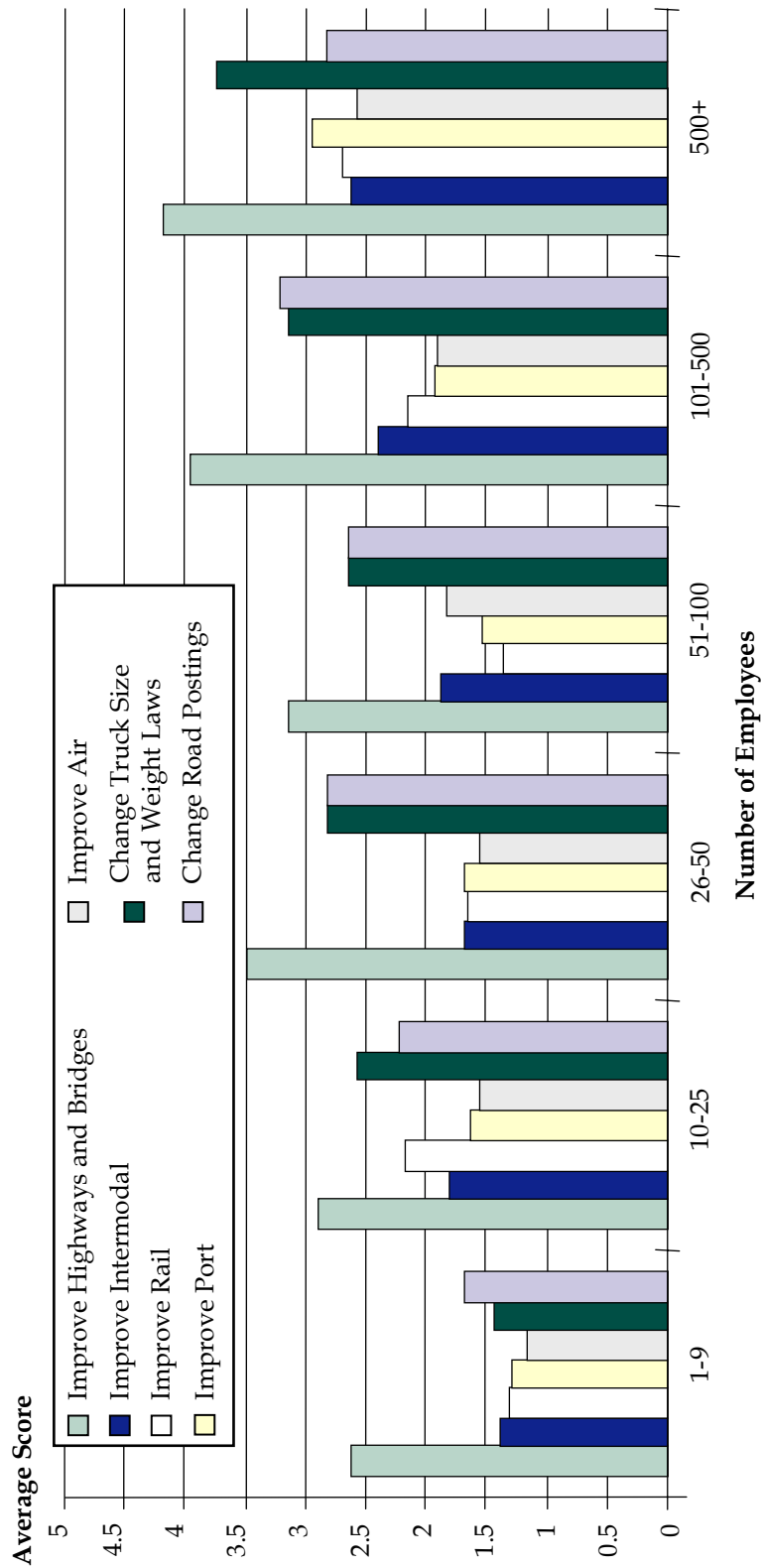
Note: Improvements were ranked on a scale of 1 to 5, 1 = least important, 5 = most important.

Rankings by Company Size

Figure 3.5 shows the average scores for each improvement type for all survey and interview participants based on company size. Again, highway improvements are the most desired type of transportation improvements by companies of all sizes. Two important points are illustrated by this graph. First, highway improvements generally gain importance as company size increases. Second, changing truck size and weight requirements also gains importance as company size increases. These observations make sense, as larger companies often maintain larger truck fleets and ship goods in greater quantities than smaller companies; upgrading highway facilities or increasing truck size and weight requirements would allow such companies to ship the same amount of goods in fewer vehicles, resulting in significant efficiency improvements and increased profits. It also should be noted that some freight stakeholders also reported a desire for stricter enforcement of existing size and weight laws.

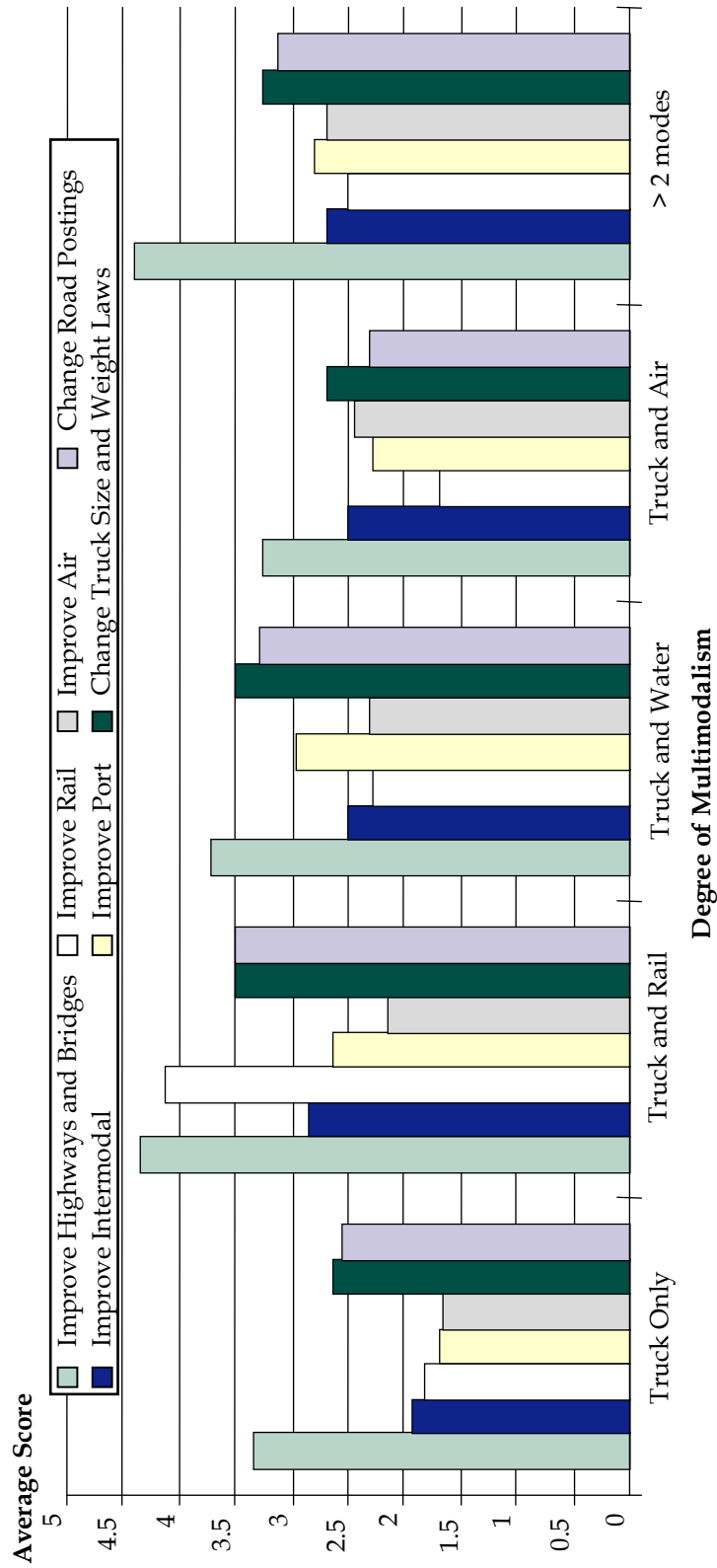
Rankings by Mode(s) Used

Figure 3.6 shows the average scores for each improvement type for all survey and interview participants based on their degree of multimodalism. Again, highway improvements are generally considered more important than other types of improvements, even by companies that utilize more than one mode of transportation. This makes sense, as most intermodal movements involve some movement by truck. Improving highways or increasing truck size and weight requirements would benefit all companies – even those that transport goods using more than one mode. Again, these results are similar to the results obtained in Maine’s 1998 Integrated Freight Plan, in which highway improvements, truck size and weight requirements, and road posting improvements were identified as the most popular transportation improvement activities among both single and multimodal shippers.

Figure 3.5 Average Scores by Company Size

Note: Improvements were ranked on a scale of 1 to 5, 1 = least important, 5 = most important.

Figure 3.6 Average Scores by Degree of Multimodalism



Note: Improvements were ranked on a scale of 1 to 5, 1 = least important, 5 = most important.

Common Problems Indicated in Shipper/Carrier Surveys and Interviews

The shipper/carrier survey and interview respondents indicated several common problems regarding freight transportation within Maine:

- **Back hauls.** Nearly 20 percent of respondents indicated that obtaining back-haul loads is a major concern. As Maine exports more to other states than it imports, many Maine-based carriers have a difficult time obtaining Maine-bound shipments for their return trips, resulting in many “deadhead” miles and reducing overall efficiency. The lack of available back-haul loads is a particular concern for larger companies. Of the 16 respondents with 500 or more employees, half identified back haul as a major issue.
- **Roadway conditions.** Poor roadway conditions, particularly along secondary routes, were mentioned by over 10 percent of respondents as a major concern. Some respondents indicated that poor road conditions have a direct effect on transportation costs, as damaged roadways lead to shipment delays and increased maintenance costs for trucks and equipment.
- **Size and weight limits.** Nearly 10 percent of respondents voiced their desire to see an increase in the maximum truck size and weight allowed on Maine roadways, particularly along I-95. Federal regulations prohibit trucks with gross vehicle weights higher than 80,000 pounds from operating on interstate highways, including I-95. This regulation forces trucks carrying heavier loads to use secondary roadways. There was a strong belief by respondents that the federal 80,000-pound limit should be increased to 100,000 pounds for six-axle commercial vehicles. In addition, many respondents also expressed their frustration with the regulations that require them to obtain permits to haul 53-foot trailers within the State. Permit requirements have been removed from many other states with the increase in use of 53-foot trailers. For example, Vermont changed its regulations on this issue, removing the requirement for a permit in 2000 by legislative action.
- **Rail service.** Over 30 percent of respondents cited the lack of adequate and consistent rail service within the State as a major concern. Though Maine is served by six railroad companies, many Maine businesses do not have easy access to their services. This is the result of abandoned rail sidings and short lines, and lack of interest by the railroads in providing specific shippers with rail service.
- **Rest areas.** Four respondents indicated that there is a lack of rest areas suitable for trucks. These and other concerns are in the process of being addressed through the Maine Commercial Vehicle Service Plan Project, designed to help the State identify ways to prevent driver fatigue through the construction, operation, and maintenance of commercial vehicle facilities.
- **Customs and Border Crossing Delays.** Nearly 14 percent of respondents cited customs and border crossing delays as having a major impact on their ability to efficiently export goods to Canada. Many survey respondents indicated that the amount of paperwork and the tariffs and fees required by Canadian Customs contributed to shipment delays and higher transportation costs. The lack of a customs clearance facility in Auburn also was mentioned as a concern.

Use of the Internet

The Internet is an important tool in the freight transportation industry. It often acts as an electronic liaison between buyers and sellers of transportation services who need to match loads to available carriers, schedule pickups and deliveries, provide electronic billing and other paperwork services, and even provides load tracking information. Approximately 85 percent of the survey and interview respondents have some form of Internet access, while 59 percent actually maintain company-specific web sites. This high degree of Internet usage among Maine businesses enhances Maine DOT's efforts to disseminate information electronically via its OFT and Maine Port Authority web sites (<http://www.state.me.us/mdot/freight/homepage.htm> and <http://www.maineports.com>).

Municipality Surveys

In addition to the surveys and interviews conducted with private sector freight stakeholders, surveys were sent to selected municipalities throughout the State that are along the location of major freight corridors. The purpose of these surveys was to:

- Identify the extent of the public sector's involvement in freight transportation planning;
- Describe the current and future needs of Maine's transportation system from the public sector perspective; and
- Generate feedback which can be used by Maine DOT to evaluate and improve upon its freight transportation planning program.

Seventeen surveys were returned from key municipalities. Although it is difficult to perform meaningful statistical analyses on a survey sample of this size, several common issues were identified from the survey responses, including:

- **Increased local truck traffic.** Because many of Maine's state highways allow greater weights than the interstate highways within the State, these roadways often experience high volumes of truck traffic. In many cases, these state highways pass directly through small towns, often as their "main streets," causing congestion and safety concerns. Commercial Street in Portland, Route 1A through Ellsworth, Route 25 through Gorham, Route 3 through Augusta, and Route 1 through Wiscasset, Bath, Brunswick, and Camden, were all mentioned by survey respondents as local roads with heavy truck volumes.
- **Lack of paved shoulders.** In a similar concern, many respondents indicated that the lack of paved shoulders along many state highways is a safety issue for pedestrians and bicyclists.
- **Rail problems.** Several rail problems were identified, including the lack of rail car storage and sidings, often resulting in trains blocking local roads at a number of at-grade rail crossings within the State.

Importance of OFT involvement in problem resolution. Municipal respondents felt that it was very important (average score of 9.3 on a scale of 10) that Maine DOT continue its active role in resolving problems related to freight transportation.

Focus Groups

The Maine Department of Transportation hosted freight stakeholder focus groups on May 30 and 31, 2001 in Augusta. Three distinct groups were invited: 1) shippers and receivers, 2) carriers and providers, and 3) government, interest groups, and trade organizations. The following provides the key issues/suggestions raised by the three separate groups. Appendix C provides the complete focus group minutes. **(It should be noted that MDOT does not necessarily recommend all of these suggestions. They are provided here to demonstrate the issues that are of great importance to Maine freight stakeholders.)**

Session 1 – Shippers and Receivers

This group suggested the following priorities for MDOT:

Improve physical infrastructure of freight transportation systems. Highway improvements mentioned included:

- Eliminate sharp corners on Route 4 Exits 9 and 12, and Route 201 in Bingham.
- Duplicate road improvements undertaken on Routes 9 and 11 on additional highways, including Routes 1, 2, 4, 25, 26, 29, 302, and the Maine Turnpike.
- Address grade issues at key locations throughout the State, particularly along Route 4 and Route 2/4.
- Consider bypasses for congested areas, either by creating new roads or improving existing roads. Access from Commercial Street to Interstate 295 in Portland was mentioned as one example. Improvements include passing lanes or breakdown lanes, such as on Route 2/4 in Farmington and Route 27/4 south from Stratton.
- Add and improve truck rest areas at strategic locations throughout the State.
- Provide clear signage and route numbers, and consider using mile markers for exit numbering.
- Solicit input from freight transportation providers as part of the existing highway planning and design process.

Government and policy changes could improve highway operations. Suggestions included:

- Increase the Interstate gross weight limit to 100,000 pounds for six-axle commercial vehicles.
- Allow operation of double 48-foot trailers.
- Expand the area permitted for 53-foot trailers.
- Streamline toll operations on the Maine Turnpike by integrating TRANSPASS with all other states and making the pass available to all drivers, providing separate truck lanes at toll plazas, and collecting tolls in one direction only.

- Improve management of peak travel times through use of available technology such as ITS or GPS, and implementation of seasonal rules and restrictions to reduce peak conflict with freight movement and tourist travel.
- Improve highway safety by expanding the enforcement program to ensure more consistency throughout the State, and providing additional training programs for all drivers, specifically truck and recreational vehicle operators.
- Make non-truck modes, particularly the rail and water modes, more attractive to Maine shippers through the use of tax incentives.

Improve rail service. The group outlined some of the problems with using rail, but no clear solutions were apparent. It was suggested that using rail would be of benefit to safety and the environment. Consideration of more short-line service, creating better links, and upgrading tracks were discussed. Policy decisions relating to future investments in the State's rail infrastructure could play a major role in future service options for shippers and receivers based in Maine.

Review port investments. Links to highways and rail are acceptable in Portland and Searsport, but not Eastport. It was suggested that building a warehouse in Calais would help both the railroad and the port of Eastport by facilitating the transfer of materials between the two modes. Amending the Jones Act also was suggested. The Jones Act is a federal regulation that stipulates use of a U.S.-flagged vessel for all movements between U.S. ports. Due in part to the requirements of the Jones Act, U.S. shippers using marine service often pay higher service fees than their Canadian competitors.

Improve passenger airline service. Improving air freight service may be impractical given the lack of heavyweight air cargo. However, there was a strong belief that the lack of frequent and affordable passenger airline service negatively affects business in general.

Provide information to shippers. Fuel alternatives and back-haul information could be provided. MDOT should consider designating the Maine Motor Truck Association web site as a link to information rather than trying to recreate the wheel, as currently is planned with the creation of the load bulletin board on the Maine Port Authority's web site. Planning should be a priority for everyone.

Improve intermodal links. Intermodal service and operations are complicated and less than adequate. There was a strong belief that if the service was dependable, the equipment was in good condition, and the process was easy, there would be significantly more shippers that would consider using intermodal service.

Session 2 – Carriers

Concern was expressed that through the load-matching bulletin board on maineports.com, as proposed by the Maine Port Authority, the State is acting as a third-party broker and competitor to private industry. Much of the group discussion focused on the perceived interference of government policy on the free market, and that market forces should determine freight modes.

Some of the concerns included the lack of cost/benefit analysis for transportation projects, spending money to enhance competing modes and essentially canceling out investments, public purchasing of railroad right-of-way, the role of the RTACs, and the role of MDOT. In fact, some participants questioned the existence of the OFT, stating that the flow of freight is and should be driven exclusively by economic factors, not by the State's desire to "balance" mode shares. In fact, specific reference was made to OFT's involvement in a privately held railroad company, which currently is undergoing serious financial problems, as an example of the challenges faced by government agencies when attempting to influence economic activity.

Two specific modal concerns also were raised. Rail costs through Canada (\$200 per switchover) discourages shippers from using rail service effectively. And although increasing the gross vehicle weight to 100,000 pounds on the Interstate system would result in loss of federal funds, there should be more concern with safety and keeping the truck traffic on better highways.

Suggestions from this group included:

- Continue infrastructure and maintenance improvements, including a need for a new bridge near Eastport, a storage facility in Portland, accelerating backlog of road repair projects, providing island transportation, encouraging terminal development and support of sound community development.
- Design highway infrastructure to address both environmental and transportation issues.
- Continue improvements to highways. Route 25 is heavily traveled; so is Route 302 from Portland to New Hampshire, also Route 2. Add a truck passing lane where possible. Route 9 improvements were supported.
- Scrutinize investments to ensure future expenditures are as effective as possible, given limited funds. IRAP State/Shipper program is supported. MDOT could provide up-to-date cost/benefit information to carriers. Moving products safely should be everyone's biggest concern.

Session 3 – Government/Interest Group

This group made the following suggestions:

Improve Infrastructure intermodally (include roads, ports, rail, air). The group emphasized that improvements should include maintaining what already exists. Economic development could benefit from integration of infrastructure. Other suggestions included:

- Improve key freight highways by providing passing lanes and left turn lanes, and providing breakdown lanes on Routes 2, 4, 27, 201 and 234;
- Upgrade connector routes such as between Routes 1 and 9, and completing the I-295 interchange in Portland;
- Construct a third bridge in Augusta and Skowhegan;
- Make highway entrance and exit ramps more tractor-trailer friendly;
- Add and improve truck rest areas throughout the State;
- Support development of a cold storage facility and a fish meal processing facility;
- Restore rail service on the Calais branch, including service from Brewer to Ellsworth and Ellsworth to Cherryfield; and
- Use technology such as TRANSPASS, transponders, CVISN, as well as ITS to create a more efficient highway system.

Planning should look at the freight transportation system as a whole. There is a need to examine key economic assets, not just highway assets and to account for all potentially usable assets. Key investments to allow free market to operate. Specific suggestions include:

- Continue efforts to address the back-haul problem in Maine, such as the web site for matching loads, although privatization of this effort should be considered.
- Develop a statewide vision of what freight is and should be. The Freight Plan must include all parties involved in the process of moving freight.
- Continue to plan for and develop air transportation. Air freight movement is important for international logistics.
- Integrate rail with other modes of transportation.
- Ensure effective landside access to waterborne transportation facilities, as it is an essential component.
- Explore opportunities for additional use of pipelines for the transport of bulk liquid and gas, as it has significant advantages.

- MDOT should better compile up-to-date statistics that others could use in planning. For example, fuel price may quickly change cost comparisons for different modes. Road postings information could be provided by MDOT.

Use common sense in regulatory issues. Participants suggested that existing and future regulations should be based on common sense, with the following specific suggestions:

- Support increased weight limits on Interstates.
- Oppose lowering the commercial driver licensing age to 18 years old.
- Use pilot studies to test programs before mandating them.
- Control access on highways to promote safety and manage congestion.
- Develop a seasonal transportation management plan to improve the mixing and operations of passenger and freight vehicles, with specific focus on major tourist regions.
- Revise the Jones Act. This federal regulation negatively impacts Maine shippers using water transportation by requiring shipments among U.S. ports to be carried by U.S.-flagged ships.
- Consider privatization of the port of Eastport.
- Review options for funding freight transportation improvement projects. Fuel pricing and tax issues need to be resolved, as programs continue to move away from traditional fuel taxes for funding transportation improvement projects.
- Encourage additional use of rail for freight flows.

Freight Advisory Committee work should continue. The Freight Committee needs to allow a role for other state agencies. Other agencies haven't been very involved. We need more interplay, and recommendations about what would make the economy stronger.

Potential Freight Improvement Projects and Policy Strategies Suggested from the Focus Groups and Surveys

The outreach efforts conducted during the update to the IFP yielded several potential freight improvement projects. These candidate projects are provided below, categorized by infrastructure improvements, policy strategies, and operational improvements/technology. Those projects marked with an asterisk (*) should be considered by MDOT as potential “quick-fix” projects. **It should be noted that these projects were identified by focus group and survey participants and have not been endorsed by MDOT personnel at this time.**

Infrastructure Improvements

- Improve geometrics (sharp corners) on Exits 12 from Route 4 in Auburn.*
- Construct breakdown lanes on Route 2/4 in Farmington.
- Improve geometrics (sharp turns) on Route 201 in Bingham.*
- Make improvements to Routes 2, 4, 29, and 395 using the improvements to Route 9 as a guide.
- Improve grading on Route 4 in Turner and on Route 2/4 in this area.
- Add truck lanes to Routes 302, 25, 26, 2, and 1 North (from Houlton to Danforth and Machias).
- Construct truck breakdown lanes on Routes 201, 2, 234, 4, and 27.
- Construct an intermodal facility in Cherryfield.
- Construct passing and turning lanes on Route 1.
- Upgrade connector routes between Routes 1 and 9.
- Complete the partial I-295 interchange to provide better access to the port of Portland.
- Improve drainage (construct a “crown”) on the seven-mile segment of Route 1 between Grand Isle and Van Buren.*
- Widen Margaret Chase Smith Bridge in Skowhegan.
- Construct paved shoulder along Route 11.

Policy Strategies

- Allow trucks to use all lanes along the Maine Turnpike when widened (i.e., do not restrict truck operations to the middle and right lanes).*
- Allow 53-foot trailers on all highways.
- Allow double 48-foot trailers on all highways.
- Expedite Maine Turnpike improvements to minimize extended inconvenience to truckers.
- Create a value-added tax on commodity shipments directed toward a freight trust fund.
- Create a tire tax to be used for transportation infrastructure improvements to supplement the existing gas tax.
- Eliminate two-way tolls on the Maine Turnpike.
- Publicize and distribute IFP update to survey and interview participants.*
- Create an email newsletter to keep freight stakeholders abreast of MDOT activities.*

Operational Improvements/Technology

- Replace existing exit numbering system in use on Maine highways with one that uses mile numbers as exit numbers.*
- Redirect tourist traffic in Portland from Commercial Street to Forest Street to facilitate truck traffic.*
- Identify peak tourist times and routes and how they conflict with peak truck times and routes.
- Use ITS/GPS to avoid long queues at toll plazas and weigh stations.
- Create clear signage and route numbers statewide, especially in areas where right lanes merge into turn-only lanes.*
- Create separate truck lanes at toll plazas.
- Install traffic signal at Eisenhower Drive and Spring Street in Westbrook.*
- Install left turn signal on 1A (near Dunkin Donuts) in Ellsworth.*
- Work with U.S. Customs Service to create customs clearance facility in Auburn.
- Improve signage to Route 7 in Corinna.*
- Install left turn arrow at Route 1 and Park Street in Wiscasset.*

■ 3.2 Economic and Demographic Data

Maine's economy grew steadily during the 1990s. Its unemployment rate fell throughout most of the decade, mirroring a national trend, but remained higher than the rate for New England as a whole. Job growth was robust, but failed to measure up to the U.S. average. By the end of the decade, Maine's average annual wage remained lowest among the New England states and below the national average. Appendix C provides a more detailed economic profile.

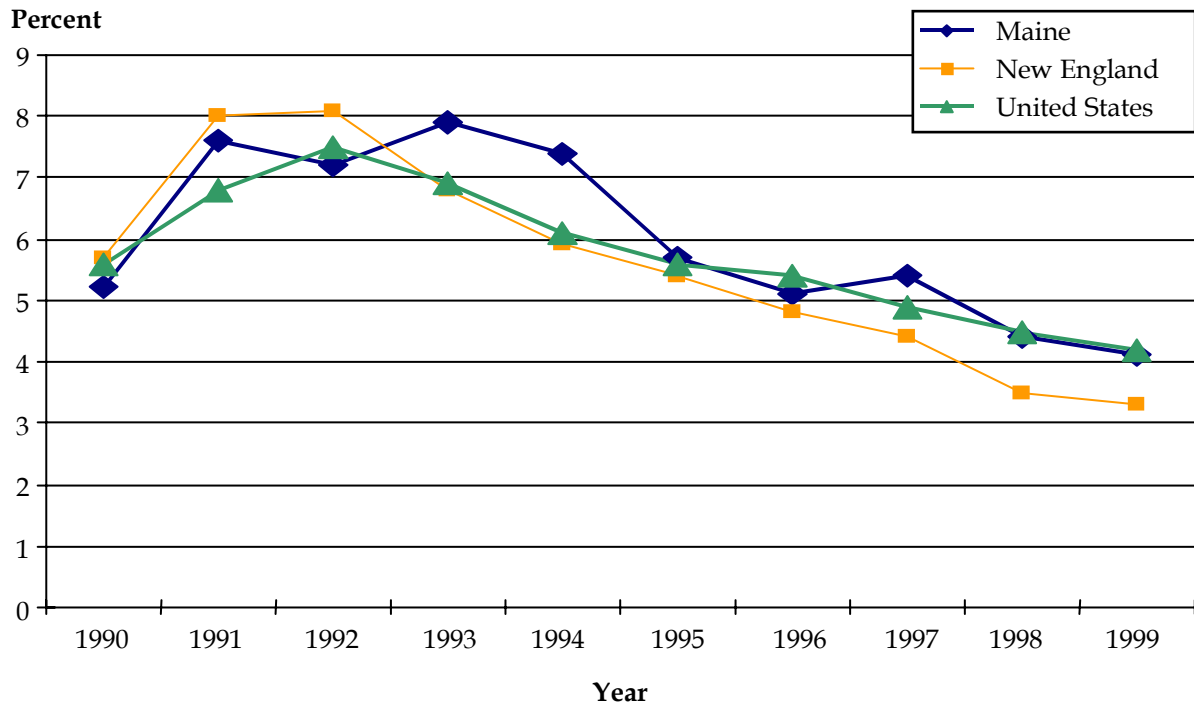
Unemployment

One of the most frequently used economic indicators is the unemployment rate. As calculated by the U.S. Bureau of Labor Statistics (BLS), the unemployment rate measures the number of job seekers in the labor force who are unable to find work.² Figure 3.7 compares unemployment rates in Maine, the U.S., and New England from 1990 to 1999. For much of the decade, Maine's unemployment rate remained close to the national average,

² The labor force is composed of two primary groups above the age of 15: employed and unemployed. The unemployed category includes a variety of individuals seeking work but does not include those making no efforts to find a job. These individuals are not considered part of the labor force.

but higher than the New England average. It fell steadily beginning in 1993, and by 1999 had reached a low of 4.1 percent, compared to 4.2 percent nationwide.

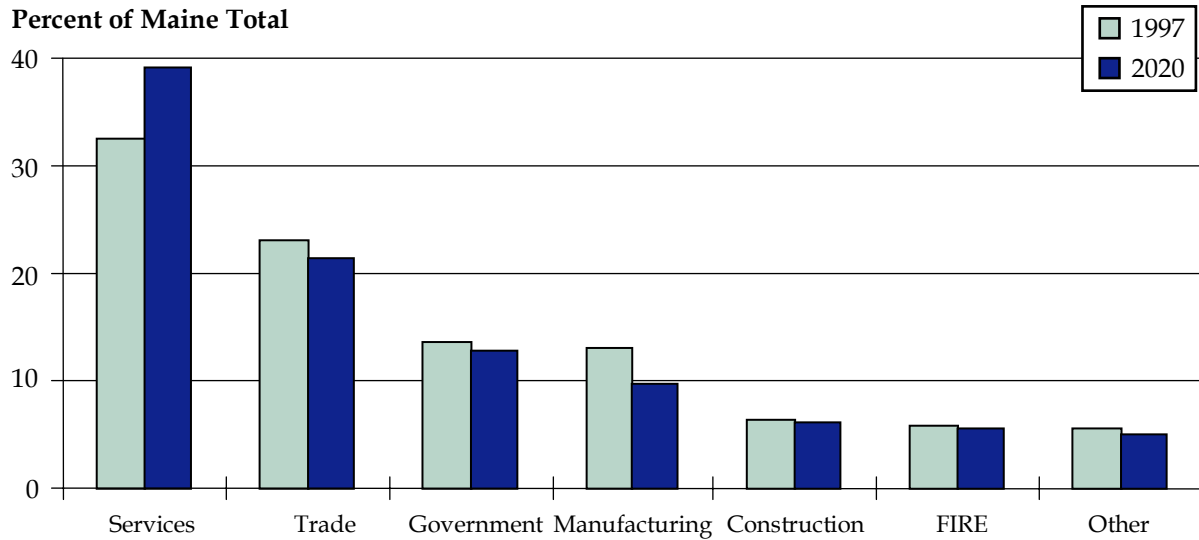
Figure 3.7 Unemployment Rates, 1990-1999



Employment

Another important measure of a region's economic vitality is employment growth. At just under 10 percent, Maine's employment growth was a little more than half the U.S. average, but somewhat higher than the New England average. Employment growth in Maine was led by retail trade, finance, business services, health services, and social services. Between 2000 and 2020, Maine's service sector is expected to grow from 34 percent to 39 percent of total employment. Distribution of Maine's employment by industry is shown in Figure 3.8.

Figure 3.8 Distribution of Maine Employment by Industry, 1997-2020

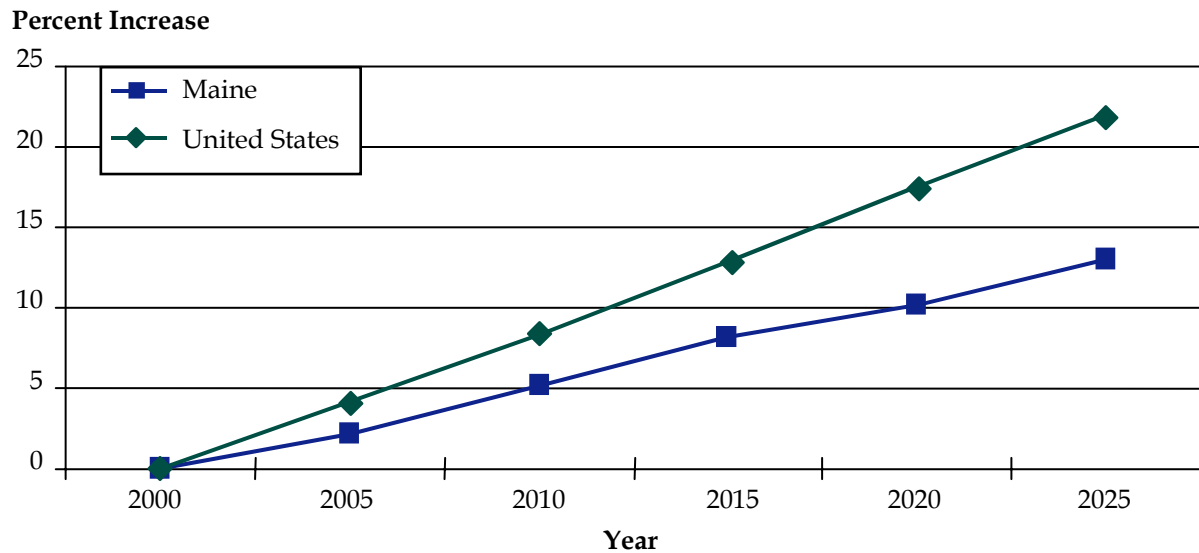


Note: Trade = Wholesale and Retail Trade; FIRE = Finance, Insurance, and Real Estate.

Population Growth

Population change is a third important economic indicator, as increases in population create added demands for goods and services. Over the course of the decade, Maine's population grew by four percent, only about one percent slower than the New England average. However, compared to the U.S. population as a whole, which grew by 13 percent over the same period, Maine grew at a much slower pace. By 2000, Maine's population ranking among the 50 states had fallen from 38th to 40th.

In the future, this trend is expected to continue. During the first quarter of the 21st century, Maine's population is expected to grow by about 13 percent, while the U.S. population as a whole is expected to grow by 23 percent. These changes are shown in Figure 3.9. This below average growth in population will potentially result in a continuation of the existing back-haul issue, which is based on a greater outbound flow of raw and finished goods than the inbound flow of goods for consumption by the population.

Figure 3.9 Population Growth, Maine versus United States, 2000-2025

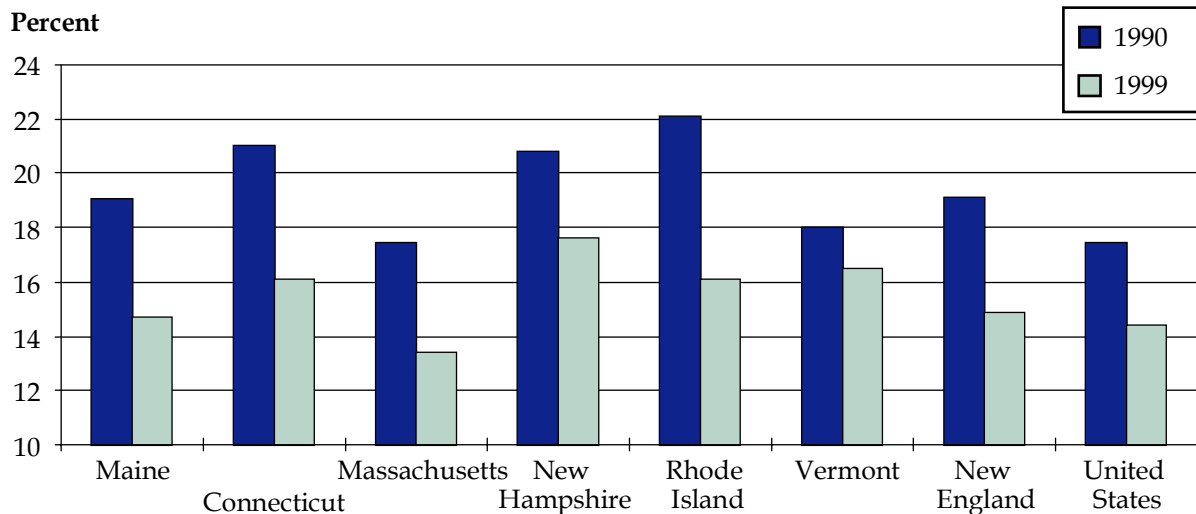
Average Annual Wages

While New England wages are on average higher than elsewhere in the country (\$35,106 versus \$31,299), there are significant differences between the New England states. Massachusetts and Connecticut have average wages in the \$37,000 to \$40,000 range, while Maine wages are only \$25,385, the lowest among the New England states and only 81 percent of the national average. The relatively low state wages are exacerbated by the decline of manufacturing jobs, the lack of post-secondary educational attainment, and very low R&D expenditures.

Manufacturing Activity

Maine's share of manufacturing employment to total employment is roughly equal to the U.S. average (15 percent versus 16 percent in 1999). Figure 3.10 presents the manufacturing share of total employment for the U.S., New England, and the six New England states in 1999. Nationwide, the relative importance of manufacturing decreased over the past decade, but the decrease in Maine was five times greater than the national decline. Traditional Maine manufacturing strengths, including transportation equipment, paper, textiles, and leather products, showed marked declines in employment during the 1990s. Losses in higher technology sectors such as industrial machinery, electronics, and scientific instruments were less pronounced.

Figure 3.10 Manufacturing Share of Total Employment, 1990 and 1999



As Maine's employment growth became more concentrated in the services industry, manufacturing's share of total state employment and wages experienced a marked decline between 1980 and 1998. After accounting for over one-quarter of Maine employment and nearly one-third of total wages paid in the State in 1980, the manufacturing sector had become a smaller component of the state economy by 1998. Indicative of the higher average pay levels per employee in manufacturing compared to non-manufacturing jobs, manufacturing's share of total state wages and compensation remained higher than its share of Maine employment throughout the 1980-1998 period.

■ 3.3 Modal Descriptions and Developments

This section presents an overview of the current status and future plans for each of the key modal components of Maine's freight transportation infrastructure: highways, railroads, ports, and airports. As detailed descriptions of each of Maine's freight modes were provided in the original IFP, this section will concentrate on developments since that plan was completed and improvements that are being planned for the future.

Highways

Maine DOT has jurisdiction over 8,391 miles of roadways, 7,619 (91 percent) of which are rural.³ Maine's highway system is generally adequate, but like many northeastern states, some of the State's smaller highways pass through small community centers, and many

³ U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics 1999*, October 2000.

have narrow segments and steep inclines due to topography. These characteristics sometimes combine to hinder commercial vehicle operations in Maine.

Since the publication of the original Integrated Freight Plan, Maine DOT has undertaken a number of projects and studies aimed at improving access to interstate highways from rural routes and intermodal ports and terminals, alleviating congestion in small community centers, and using emerging technologies to improve commercial vehicle operations within the State.

In addition, MDOT has established a seven-step strategy to address east-west transportation issues in Maine. This strategy was developed as a result of the MDOT study released in 1999 that investigated the feasibility of a new four-lane east-west highway across Maine. This strategy defined projects to improve and enhance existing roadways as an alternative to constructing a new highway. A detailed description of this strategy and the status of each step is available from MDOT. The following sections discuss current highway improvement projects being studied or implemented by MDOT, three of which (Interstate 395 Extension Study, Skowhegan Transportation Study, and Calais/St. Stephen Area Border Crossing Study), are included in the seven-step strategy.

Interstate 395 Extension Study

Interstate 395, located in the Bangor/Brewer area, was designed and constructed in the early 1980s and currently terminates at Route 1A in the Brewer/Holden area. Route 9 is a principal arterial providing a connection between the Canadian Maritime Provinces and the United States interstate system, and has developed into a vital freight transportation corridor for Canadian trade. As there is no direct connection between Route 9 and I-395, vehicles wishing to connect to I-95 from Route 9 must travel along:

Route 1A, which provides a direct connection between I-95 and Ellsworth, Bar Harbor, and Acadia National Park;

Route 46, which provides a connection between Route 9 and Route 1A; or

Through downtown Brewer along Route 9.

Increasing trade with Canada has led to an increase in the number of trucks traveling along Route 9. As many of these trucks must connect with I-95, Routes 1A and 46 also have been experiencing significantly higher truck volumes, resulting in increased congestion and crashes. As part of its East-West Highway Strategy, MDOT currently is investigating the feasibility of extending I-395 to connect to Route 9, thus providing a direct connection between the U.S./Canadian border crossing at Calais and I-95.

Wiscasset Route 1 Corridor Study

Growth in travel demand within the Mid-Coast Route 1 corridor, especially in Woolwich, Wiscasset, Edgecomb, and Newcastle, is having negative impacts on environmental quality, public safety, and freight transportation mobility. These effects are particularly evident during the summer tourist season. Congestion in downtown Wiscasset, for example, severely hampers the flow of trucks along the critical Route 1 corridor. To address this

issue, MDOT currently is undertaking a study to analyze various transportation alternatives to mitigate congestion along the Route 1 corridor, particularly in the Wiscasset village area. The proposed project must sustainably and cost-effectively increase public safety, enhance mobility, and provide a net improvement to the environment. Alternatives currently under consideration include two new alignment strategies (a northerly route and a central route), as well as access management and transportation systems management plans for the affected sections of Route 1.

Skowhegan Transportation Study

The purpose of the Skowhegan Transportation Study is to improve traffic safety and relieve truck and traffic congestion in downtown Skowhegan and along Routes 2, 201, 104, 150. The study also aims to develop recommendations designed to improve regional east-west and north-south traffic flow through the Skowhegan area for regional commuters, through travelers, and local residents. The need for such a study and any subsequent improvement projects arose from the limited capacity and poor level of service of the existing Skowhegan bridge and its approaches as well as its ability to handle current and future traffic demand.

Aroostook County Transportation Study

Aroostook County suffers from declining population levels and stagnant employment growth. In an effort to improve transportation access to, from, and within Aroostook County, and hence bolster the county's economic development efforts, the Aroostook County Transportation Study was launched in 1999. The purpose of the study is to improve the competitive advantage of companies in this region by recommending a set of transportation improvement projects designed to lower transit times for people and goods. MDOT is supporting this effort by developing alternative highway alignments that would improve Aroostook County's access to I-95. MDOT is expected to use the preferred alternative and any subsequent projects from the Aroostook County Transportation Study as a guide for future improvements to the Aroostook County highway network. MDOT has been undertaking an extensive NEPA study to look at a number of alternatives to improve highway mobility and economic development in Aroostook County. The process started with 40 alternatives, which have now been reduced to four remaining build alternatives. The NEPA Environmental Impact Study will be released in early 2002 for public comment and review. Any preferred alternatives and projects that are a result of this study will improve the flow of freight transportation to, from, and within Aroostook County.

Calais/St. Stephen Area Border Crossing Study

The border crossing at Calais, located on a small lot in downtown Calais, is the seventh-busiest commercial crossing along the U.S./Canadian border. Truck traffic traveling into Maine through this gateway doubled during the past decade, from approximately 70,000 truck trips in 1990 to nearly 140,000 in 2000. The small size and poor access of the existing U.S. Customs facility at the crossing hinders the efficiency of freight inspections, not only causing shipment delays, but also hampering the flow of automobile traffic. As freight volumes at this border crossing continue to grow, it is anticipated that a 25-acre facility will be required.

To address these and other issues, MDOT has joined with the Federal Highway Administration, the General Services Administration, and the New Brunswick Department of Transportation to develop recommendations that would improve the flow of people and goods across this critical gateway. Currently, two build alternatives are under consideration – the Calais Industrial Park site and the Baileyville Route 9 site. This NEPA study, along with the Skowhegan Transportation Study and the I-395 Extension Study, form the core of Maine’s East-West Highway Strategy.

Portland I-295 Connector Study and Widening Project

I-295 in Portland and South Portland is one of the most heavily traveled highways in Maine. Portions of I-295 carry more than 70,000 vehicles on an average day and 7,000 vehicles in a single hour, some of which are trucks bound for Portland’s waterfront area. Though Portland’s waterfront is home to the International Marine Terminal’s container handling facility, Merrill’s Marine Terminal, and various other businesses, access to and from I-295 is limited due in part to inadequate ramp connections. The lack of convenient access to the waterfront from I-295 contributes to increased shipping costs and high truck volumes in adjacent residential neighborhoods. MDOT currently is investigating alternatives designed to improve access to the Portland waterfront from I-295.

In addition to its limited access to Portland’s waterfront, I-295 also provides lower levels of service at several locations during peak hours. Both recent historical trends and future traffic forecasts indicate that traffic along both I-295 and the Maine Turnpike will continue to grow. In fact, between 2000 and 2025, traffic volumes at most I-295 locations is expected to grow between 20-25 percent. Given this information, MDOT continues to evaluate a variety of transportation improvement alternatives to address the existing and future congestion issues. Proposed alternatives include the construction of new travel lanes on the Maine Turnpike through the Portland area, the development and implementation of alternative toll collection strategies on the Maine Turnpike, various interchange improvements, and the widening of I-295 in the Portland area.

Other Examples of Major Feasibility Studies

Examples of other major feasibility studies are listed below. The findings of each study may lead to projects scheduled for future MDOT programs that would improve freight transportation in Maine.

Augusta River Crossing – Recently concluded NEPA process will lead to construction of a third highway crossing of the Kennebec River in Augusta to link I-95 and Route 3.

Bath Westerly Access – Feasibility of strategies to improve access to Bath and the Sagadahoc Bridge from points west.

Ellsworth Area Study – Identify feasible long-term solutions to growing traffic congestion in Ellsworth and on Routes 1, 1A, 3 approaches to the city.

Gorham Bypass – Preliminary engineering and environmental studies of bypass alternatives and other corridor improvements.

Trenton Corridor – Develop, in cooperation with the Town, a coordinated transportation and land use development plan for the corridor.

Access Management

In May 2000, the 119th Maine Legislature approved LD 2550, in Maine. The purpose of the act was to assure the safety of the traveling public and protect highways against the negative impacts of unmanaged growth. The law is intended to conserve state highway investment, enhance productivity, manage highway capacity, maintain rural arterial speed, promote safety, and conserve air, water and land resources.

In order to comply with this new legislation, Maine developed an access management program. Access management techniques are designed, in part, to help the free flow of trucks by limiting the entry and exit points to and from the main stream of traffic. By actively controlling the amount of traffic entering and exiting these major highway corridors, products can move in a more timely fashion between their origins and destinations. Maine's Access Management Program includes access management rules, access acquisition/control strategies, access development, and corridor planning. The goals of Maine's Access Management Program are as follows:

Increase Safety. Highway crashes related to cars entering and leaving the public way resulted in an estimated economic impact to the state of Maine of \$106 million in 1999 and approximately \$1.2 billion over the past 10 years. In 1996, one in six crashes occurred at driveways or entrances; one in five people involved in crashes were involved in driveway or entrance-related crashes. By controlling access to and from major corridors, Maine's Access Management Program will increase safety of highway and driveway users.

Enhance Productivity. Arterial highways represent only 12 percent of the state-maintained highway system, but carry 62 percent of the statewide traffic volume. Maintaining posted speeds on this system means Maine's people and its products move faster, thus enhancing productivity, reducing congestion-related delays and slowing environmental degradation.

Avoid Future Construction Costs. By preserving the capacity of the current system, the need to build costly new highway capacity, such as new travel lanes and bypasses, is reduced.

Access management rules are viewed as only one part of the statewide access management program. The program aims to provide funding for the purchase of access rights along certain rural arterial corridors that may experience capacity decreases, safety declines, and diminished posted speeds due to increasing development and commuter and visitor pressures. Rural arterial corridors most at risk are those where congestion is already being experienced or where current driveway-related crash rates exceed the 1999 statewide average. The identification of these "at-risk" corridors is currently underway.

Commercial Vehicle Information Systems and Networks (CVISN) in Maine

The intent of the federal CVISN effort is to break down stovepipes of information (or “islands of technology”) that exist in states, and replace them with a network of linked systems owned and operated by states, federal government, motor carriers, and other third parties. CVISN efforts in Maine are directed toward enhancing and rebuilding information systems that process and issue CVO credentials and process and distribute safety performance information on carriers and trucks. Personnel from MDOT Office of Freight Transportation (OFT) and the Information Systems Division of the Maine DOT, as well as staff from the State Police, the Bureau of Motor Vehicles (BMV), and the Maine Violations Bureau, recently attended a one-day CVISN Introductory Course sponsored by the Federal Motor Carrier Safety Administration (FMCSA) and the I-95 Corridor Coalition. This was held as preparation for Maine’s future participation in CVISN work shops sponsored by FHWA.

ITS/CVO Working Group

The ITS/CVO working group consists of representatives from the MDOT Office of Freight Transportation, BMV, the Maine Violations Bureau, the State Police, Revenue Services, Bureau of Information Services, and Maine Motor Transport Association. It was formed in 1996 as part of the State’s participation in an FHWA Mainstreaming Program, a precursor to the CVISN Program. The group meets regularly to discuss CVO-related projects and activities. The group currently is overseeing the UMCAMS project and is updating its 1998 business plan.

Unified Motor Carrier Account Management System (UMCAMS) and Performance Registration and Information Systems Management (PRISM)

UMCAMS is being developed by the Bureau of Motor Vehicles (BMV) as the central repository for carrier, driver, and vehicle information. Data is linked using the carrier U.S. DOT number as a common identifier. UMCAMS is designed to support roadside enforcement and safety evaluation activities as well as data exchange across different program areas. The Performance Registration and Information Systems Management (PRISM) program ties motor carrier safety ratings to commercial vehicle registrations (Maine joined the nationwide PRISM program in 1999). UMCAMS key features include common management of the International Registration Program (IRP), the International Fuel Tax Agreement (IFTA), and intrastate fuel accounts (i.e., interstate vehicle registration and fuel tax licensing, and intrastate fuel tax licensing); architecture that supports eventual linking of all IRP, IFTA, operating authority, safety, over-limit permitting, and crash and violations data; compliance with PRISM program (e.g., PRISM data transfer requirements); and compatibility with national CVISN architecture standards and protocols. UMCAMS will allow for more efficient interaction between Maine motor carrier databases and national information systems such as IRP and IFTA, improved capability for exchanging carrier data with other states and Canadian provinces, and improved participation in national safety programs such as PRISM.

BMV has begun UMCAMS implementation by hiring a contractor to implement an IRP processing system and establish an interface with IRP Clearinghouse. The contractor will

develop a common account management for IRP, IFTA, and intrastate fuel licensing; and will develop PRISM functionality.

The IRP system will be functioning by February 2002, and UMCAMS priority functionality is anticipated to be established by June 2002. In the longer term, oversize/overweight permitting, and crash and violations data will be linked to UMCAMS and Maine State Police will have UMCAMS access via laptops. Other activities include:

Modernizing and automating weigh stations. In the Kittery-York weigh areas, several projects are underway. These include storage lane addition, installation of in-ground weigh scales, and preliminary engineering for an automated weigh station (i.e., automated vehicle clearance).

Developing systematic state investment policy for truck/roadway freight sector. A Heavy-Haul Truck Route Study is being conducted to identify and designate Maine heavy-haul truck routes and develop a methodology for assessing and prioritizing improvements on the State's truck route network. Work currently is scheduled to be completed in December 2001.

Nationwide shortage of rest areas for commercial vehicles. Maine has a primarily rural highway system with widely scattered rest areas for commercial vehicles, suggesting the need to evaluate commercial vehicle rest area needs. Realizing this need, MDOT recently hired a consultant to assist in developing a plan for determining and addressing commercial vehicle rest area needs.

Deployment of weigh-in-motion stations. By the close of 2001, the State will have 10 WIM stations deployed throughout the State. These will be used to collect truck weight data primarily for planning purposes.

Increase in truck weight fines. Recent legislation was passed, which will be enacted in January 2002, that triples existing fines for overweight trucks. The fine schedule is tied to pavement deterioration rates, which increase exponentially as weight increases. This was the first increase in truck fines in over 20 years.

Railroads

A separate analysis of national railroad trends and railroad operations in Maine was performed for this study, the results of which follow.

National Rail Overview

Currently there are seven large Class I and more than 500 regional and short line railroads in the United States. These companies produce nearly 1.5 trillion ton-miles of freight service, operate more than 20,000 locomotives and nearly 1.4 million freight cars on 122,000 route miles of track, and employ 230,000 people. More than 17 percent (by weight) of Maine's interstate commerce moves by rail on at least one of these carriers. Figure 3.11 shows a breakdown of the top commodities moving by rail, nationally.

In 1999, these railroads generated almost \$36 Billion in revenue, roughly 6.3 percent of the nation's freight bill. Figure 3.12 presents an historical view of Class I railroad performance and shows the relative changes in productivity, volume, revenue, and price since 1981. In 1999, freight railroads accounted for more than 40 percent of the nation's intercity ton-miles, which is indicative of the rail system's place in the freight transportation marketplace. Railroads are primarily a long-distance transportation provider, mainly of high-weight/low-value commodities. This is clearly shown in Figure 3.11, which identifies the nation's largest rail commodities by tonnage.

The rail industry was largely deregulated as a result of the passage of the Staggers Rail Act in 1980. Deregulation permitted railroads to improve profitability through downsizing and consolidation through mergers. As a result, operating margins improved to 16 to 20 percent and return on investment approached 8.0 percent.

This downsizing led to the revitalization of the regional and local railroad industry. Many branch lines were spun off. In some cases this led to formation of new, smaller railroad companies. Today, there are over 500 such firms generating approximately 10 percent of all rail freight revenue and owning approximately 29 percent of the nation's track miles. This process occurred in Maine. The Canadian National spun off the SL&A and the Canadian Pacific spun off significant portions of the current BAR system. Presently, Maine is served exclusively by regional and local railroad firms.

Figure 3.11 National Rail Commodities, 1999

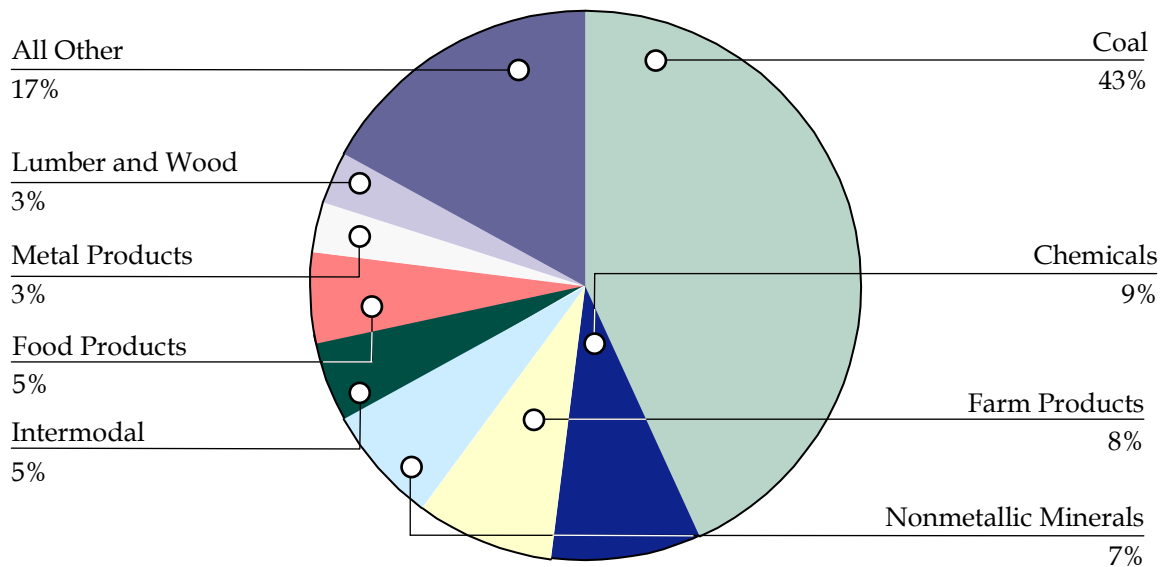
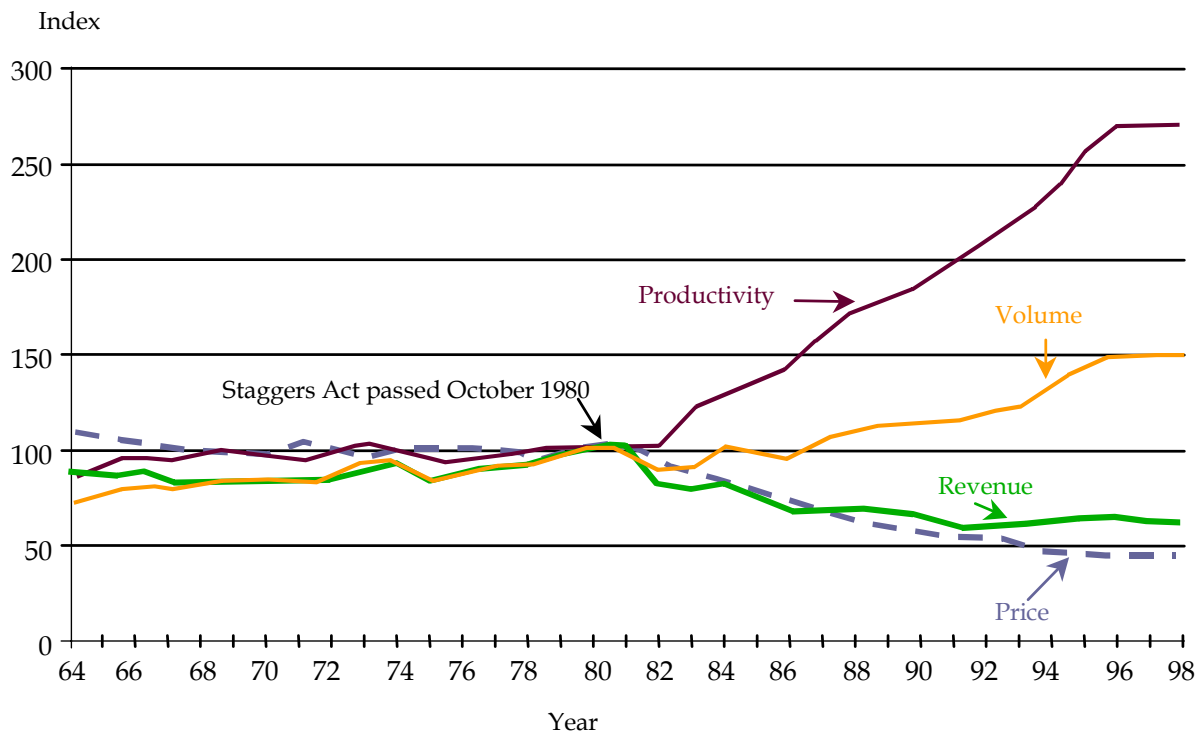


Figure 3.12 Class I Railroad Performance, 1964-1998 (1981 = 100)

Source: AAR

Following deregulation, rail market share, which had declined from 61 percent in 1940 to 35 percent in 1978, began to show a positive trend. Rail share peaked in 1996 at 40.6 percent and leveled in the last half of the 1990s primarily due to service problems associated with the complex rail mergers of that time. Figure 3.13 provides a historical trend of rail market share.

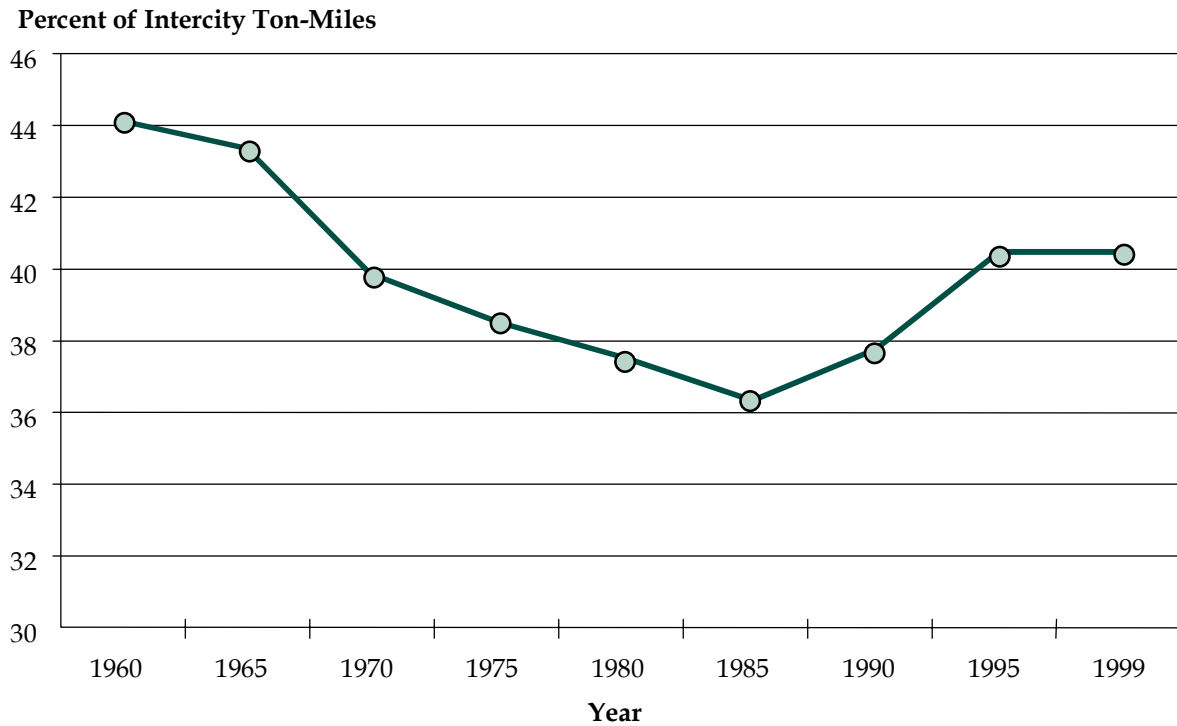
In recent years, the fundamental problem for the rail industry has been that, despite the improvement in performance, financial returns have not been adequate to fully justify capital replacement. In other words, the railroads have not been earning their cost of capital. Figure 3.14 illustrates this point by showing railroad cost of capital and return on investment from 1990 to 1999. As can be seen in Figure 3.14, there is a sizeable gap between the percentage of revenue spent on capital costs and the percent return on those investments. This financial pressure drove the mergers of the 1990s as railroads sought to take advantage of the natural economies of scale in the industry. Unfortunately, two of the last four large mergers, Union Pacific with Southern Pacific and the break-up of Conrail, were not handled well and resulted in serious service problems.

In the case of the Union Pacific, integration of the Southern Pacific and the Chicago and Northwestern System in rapid succession, created operational problems, often referred to as the “meltdown.” These problems took several years to resolve.

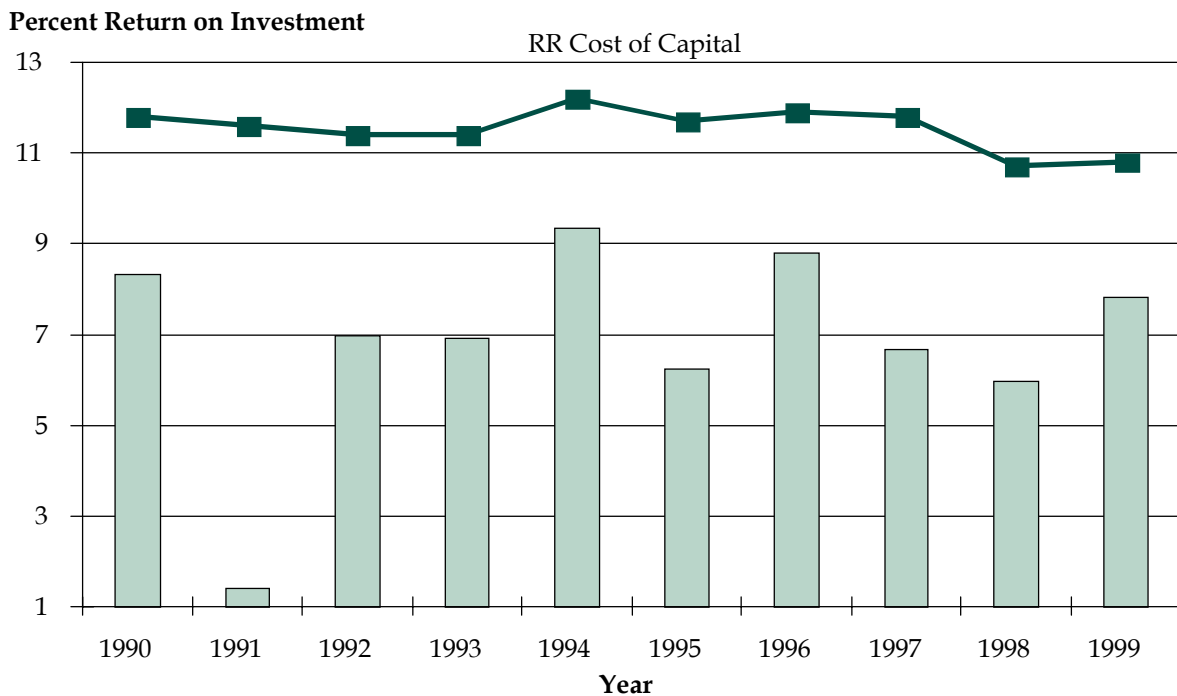
The Conrail situation was somewhat different in that it involved a break-up of a system that had been fully integrated over a 20-year period into two parts and then a reintegration of those parts into two different systems with disparate operating philosophies. This was an enormously complicated operating challenge that was not fully met. The result was serious service degradation. As with Union Pacific, it has taken several years to return service to previous levels. This has had some impact on rail service to Maine, as some rail shipments to states outside of the Northeast U.S. experienced delays as they entered the NS/CSX system.

When Canadian National and BNSF announced a merger in late 1999, The Surface Transportation Board (STB) declared a 15-month moratorium on mergers and began preparing new rules for the process; this moratorium ended in June 2001. Ostensibly, these new rules, which have not yet been tested, make mergers between large Class I railroads more difficult. It is interesting that the rules apparently apply only to the six largest railroads. Kansas City Southern, the smallest Class I, is specifically excluded from the new rules and the merger of Canadian National with Wisconsin Central is being handled by the STB as a minor transaction. For railroads in Maine, the new rules are at least meaningless as they apply only to mergers between the six large Class I railroads. At most, they may make Maine railroads targets, as mergers between large and small railroads will be relatively easier to accomplish in the future.

With useful downsizing largely complete and big mergers postponed, railroads have been looking to marketing and operational initiatives to improve profitability and close the cost of capital gap. Leaders in this arena are Canadian National and Burlington Northern Santa Fe, which are operating “scheduled railroads” and enjoying reduced cost and increased volume and revenue as a result. It is likely that the Canadian National initiative is aiding the service of its strategic partner, the SL&A. In addition several initiatives are underway to use the increasing capabilities of the Internet to develop more market channels for various rail services. The split up of Conrail and the successful integration of that system into the NS and CSX systems also is aiding Maine shippers, as they now have access to these two competing railroads via Guilford for east/west and north/south service.

Figure 3.13 Rail Market Share, 1960-1999

Source: AAR.

Figure 3.14 Railroad Capital Costs and Return on Investment, 1990-1999

Summary of National Rail Overview with Emphasis on Maine Impacts

Maine's regional and short line railroads are part of a North American rail system that provides an important option for Maine shippers and receivers, particularly the forest products industry, to reach markets beyond the borders of the State.

The performance of this continental rail system depends upon the actions and financial strength of seven large private sector firms, the Class I railroads.

Because of their recent lack of financial strength and related merger activity, the national rail system has experienced turmoil over the past several decades. This turmoil has impacted the rail service provided to Maine's producers and consumers.

Some of the issues that have produced instability in the rail industry have not been resolved and can be expected to continue to impact the North American rail system to some extent into the foreseeable future.

Maine Freight Rail Operations

The state of Maine is served by eight private railroads operating approximately 1,200 miles of track. In 1999 these firms employed more than 750 workers and moved more than 7.6 million tons of freight (see Table 3.1).

Table 3.1 Maine Railroads

Railroad	Maine Miles	Intermodal Terminal
Bangor & Aroostook Railroad	414	Presque Isle
Guilford Rail System	372	Waterville
Belfast & Moosehead Lake Railroad	33	
Canadian American Railroad Co.	102	
Eastern Maine Railway Co.	100	
Safe Handling Rail, Inc	92	
New Hampshire North Coast Corp.	1	
St. Lawrence & Atlantic Railroad	85	Auburn

The three regional carriers, the St. Lawrence and Atlantic (SL&A), the Guilford Rail system, and the Bangor and Aroostook Railroad Company (BAR), form the core of the regional rail network. The forest products industry is clearly the "anchor" customer.

Data from the Association of American Railroads (AAR) show that the amount of interstate freight carried by rail in Maine has increased between 1996 and 1999 by approximately 10 percent in carloads (102,000 versus 92,000), while tonnage carried has increased

20 percent. Figure 3.15 shows rail tonnage in Maine by origin and destination from 1991 through 1999. This increase was driven by a more than 30 percent increase in pulp and paper products. Nationally in the same period, rail traffic remained essentially constant. The national number is likely impacted by the Union Pacific “melt-down” while the Maine number covers a period just prior to the Conrail break-up.

Rail service is an important component of the freight transportation mix in Maine since it is particularly cost-effective when moving high-volume, low-value commodities, such as forest products, between harvesting points and processing locations, which in the case of Maine may involve considerable distances. By weight, more than half of the products moved in Maine by rail are related to the forestry industry. For example, in 1999 pulp and paper constituted 55 percent of originated traffic. When adding 1.1 million tons of other forest products, nearly 80 percent of Maine’s originating rail tonnage falls into this category.

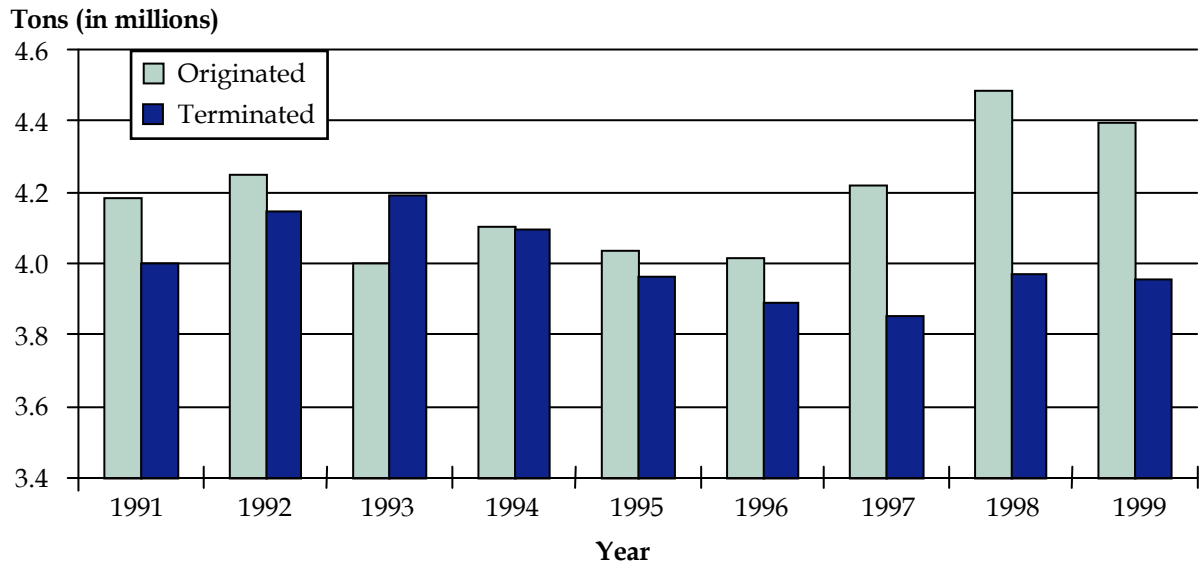
Interstate rail tonnage is nearly balanced inbound versus outbound – 4.0 million tons terminated versus 4.4 originated. As previously indicated, paper and forest products are the dominant export commodities. Major inbound commodities include petroleum products, clay, paper, and chemicals. In addition to the interstate traffic, a significant percentage of Maine’s rail traffic is intrastate. In 1999 this volume was approximately 1.34 million tons and was primarily lumber and paper products moving between various stages of the manufacturing and distribution process. Figure 3.16 shows the top commodities moving in Maine by rail.

The three regional railroads connect with the Class I carriers to provide service to points across the continent in both the U.S. and Canada. All three railroads have connections to Chicago, a major destination for rail and intermodal traffic; SL&A and BAR also provide direct services to Montreal. Both Guilford and SL&A have excellent connections to other key national rail hubs.

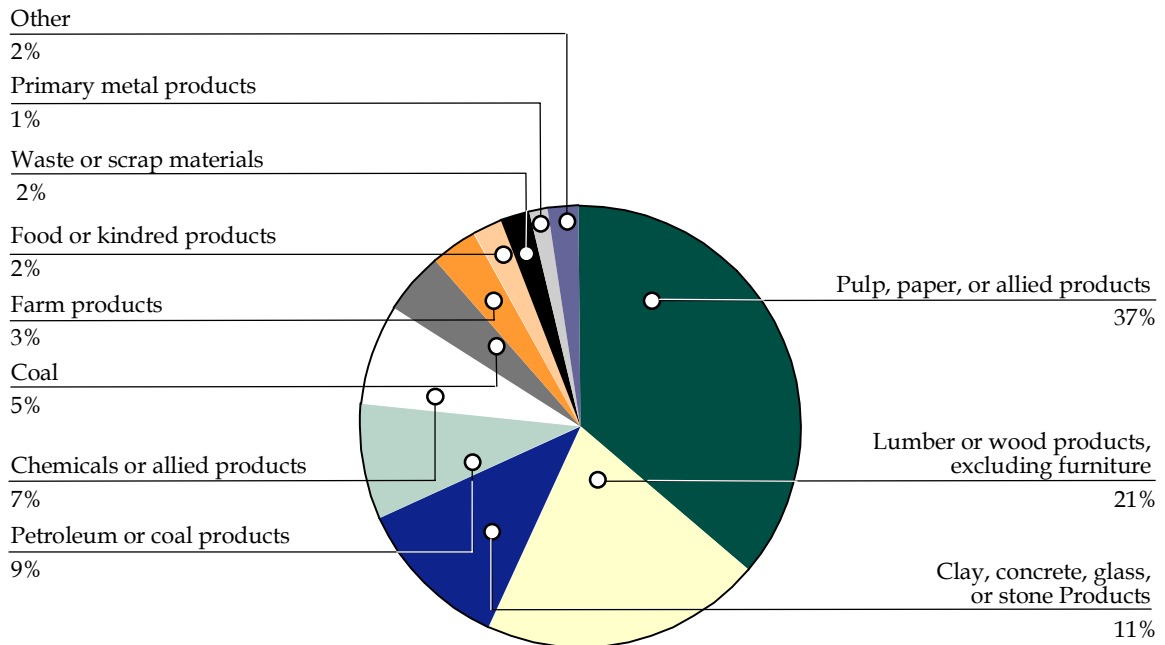
Stakeholder Survey. A recent survey of both service providers and users indicates serious concerns with rail service, including:

- Poor rail service as a key issue of Maine’s freight transportation system;
- Problems with service consistency and reliability;
- The need for timeliness in handling bulk rail shipments; and

These concerns are consistent across the country and reflect the reasons for the loss of rail market share over the past 40 years. The following sections provide more detail on the three regional rail operators in Maine.

Figure 3.15 Maine Rail Tonnage, 1991-1999

Source: AAR.

Figure 3.16 Top Rail Commodities for Maine, 1998

Bangor and Aroostook System. This system is composed of five connected railroads and Logistics Management Systems (LMS). The principal railroads are the Bangor and Aroostook Railroad (BAR) and the Canadian American Railroad (CDAC); the others being small operations such as the Van Buren Bridge company, etc. All are subsidiaries of Iron Road Railways, Inc (IRR), with about 850 miles of contiguous trackage. The IRR railroads are collectively referred to as the “BAR System.”

The BAR generally operates one train daily North-South and two trains East-West. The north-south routing connects with the Guilford system at Northern Maine Junction, near Bangor, for traffic moving into Southern New England and other points. The east-west traffic is CDAC, which connects with the BAR at Brownville Junction. CDAC is the tariff carrier between Montreal and St. John, with connections to Canadian National and Canadian Pacific. Much of the traffic on the CDAC is steamship traffic between St. John and Montreal. This route is cleared for double-stack traffic (two high cube containers). This traffic is relatively new and has developed as Halifax and St. John become increasingly important as first ports of call for traffic en route to Midwestern points as well as southern New England. *As of this writing, BAR is under bankruptcy proceedings with a decision as to the future of the company to be determined by the court. More than one company has expressed an interest in acquiring the BAR, however, at this time no decisions have been reached.* In the meantime the BAR is continuing normal operations.

The Guilford System. This system is the only fully integrated railroad operating in Maine. The system stretches east/west from Mattawamkeag to Mechanicville, New York, and north/south from White River Junction, Vermont to Waterbury, Connecticut, covering approximately 1,500 miles in six states and eastern Canada.

The system interconnects with four Class I railroads; the CSX at Worcester, Massachusetts and at Albany, New York (Rotterdam Junction); the Canadian Pacific (D&H) and NS at Mechanicville, New York; and Canadian National at Danville Junction, Maine. In addition, the Guilford system interconnects with several other regional and short line railroads within Maine. These junctions provide connections to the SL&A at Danville Junction, the BAR at Northern Maine Junction, and CDAC at Mattawamkeag.

The Guilford Rail System serves the vast majority of Maine’s paper and forest products mills with a scheduled service package tailored to each mill. In addition, the system is the only carrier to directly service the port of Portland.

The St. Lawrence and Atlantic. The SL&A, a subsidiary of Emons Industries, operates 82 miles of track from Auburn to the Maine-New Hampshire border at Gilead, and has recently acquired additional trackage as far as Richmond, PQ. This provides a 260-mile route of contiguous trackage between the eastern terminus at Auburn and western connections. The railroad connects with the CN system to Montreal.

In December 2001 it was announced that Genessee and Wyoming, Inc. (GWI) has agreed to acquire SL&A’s parent company Emons Transportation. This transaction is expected to be completed in the second quarter of 2002. Emons’ principal subsidiaries are the two railroads that comprise the SL&A; the SLR in the United States and SLQ in Canada. GWI

plans to generate economies by coordinating SL&A's operations with its own rail operations in Quebec.

Consistency of service has enabled SL&A to significantly grow both the carload and intermodal business. Through the Canadian National connection, SL&A provides single line service to Vancouver, and with the Canadian National/IC merger, offers service to New Orleans. Other connections allow service to Texas and Mexico. Concerted marketing efforts resulted in a steady increase in carload business by over 20 percent in the last four to five years, to approximately 2,000 carloads monthly. In addition, SL&A has been successful in diversifying its traffic. New yard capacity was added at Auburn to handle this traffic growth. The state of Maine contributed approximately \$1.6 million to this project. Although some recent events have had a negative impact on revenues, it is anticipated that the railroad will continue to grow under new ownership.

Intermodal Terminals and Services

SL&A Auburn. SL&A provides intermodal service via its Canadian National connection to points in both the U.S. and Canada. Canadian National's merger with IC along with newly developed partnerships with KCS and Tex-Mex opens Maine rail markets to new opportunities that SL&A is actively marketing. The SL&A is fully cleared for two high cube double-stacked containers between Auburn and Montreal.

The SL&A's Auburn intermodal traffic experienced significant growth in 2000 versus 1999, after a period of relatively low traffic for several years. This growth continued into 2001 with the development of new Mini-Landbridge (MLB) traffic from the Pacific Rim via the port of Vancouver. Mini-Landbridge is generally defined as traffic received over a Pacific coast port with a destination on the U.S. east coast (in this case Boston and Northern New England). The intermodal lift count for the year ending in June 2001 was approximately 14,500 units, up approximately 30 percent from the previous year's 11,000 lifts and exceeded the terminal's capacity. As a result, the Maine DOT and SL&A jointly funded an expansion project to double the size of the intermodal facility from 17 to 35 acres.

Intermodal train service is provided five days a week, Tuesday through Saturday. The MLB service from Vancouver provides sixth morning availability, consistent with service provided to other MLB terminals serving the Boston and New England regional markets.

BAR Presque Isle. The BAR System has two intermodal routes: North-South and East-West. The East-West service is primarily intermodal with service dictated by steamship arrivals and departures. BAR operates its North-South service to handle all traffic, but will operate a separate intermodal train to meet service requirements. Consistent 60-hour transit is being provided between Presque Isle and Ayer, Massachusetts.

A new rail served industrial park has been developed by the city of Presque Isle. Approximately \$3.3 million has been invested in the project, including \$1 million by the State. The industrial park is owned by the city of Presque Isle, and has approximately five and a half miles of track that includes a fully operational intermodal terminal. The intermodal terminal is operated by IRR subsidiary LMS, which also provides all switching

service to other customers. Currently the intermodal facility has one major customer, a shipper of frozen foods in refrigerated trailers, plus sporadic business from other shippers. Weekly volume of 50 to 60 lifts in mid 2001 has dropped to a level of about 30. It is expected that the railroad will see a return to the previous level in the future. Currently the traffic is moving via BAR to Northern Maine Junction, thence Guilford to Ayer, MA, from which point it is trucked to Southern New England and Pennsylvania destinations. BAR's north-south route is not cleared for double-stack operation.

The second BAR System intermodal routing is primarily East-West, providing service between the Canadian ports at St. John (primarily), Halifax, and Montreal. This traffic consists primarily of various steamship line containers moving between Europe via St. John and Canadian points as well as the U.S. Midwest, and is estimated to be between 100 and 200 containers weekly in each direction on a CDAC routing through Maine. Halifax and St. John are the first North American ports of call for a number of steamship line services. The Halifax traffic moves on a direct CN routing, but some of the St. John traffic is moving on CDAC as indicated, taking advantage of transit time savings. This line is cleared for double-stack operation.

A portion of the Canadian port traffic from both Halifax and St. John is destined for eastern New England, including southern Maine. This traffic moves via NBSR to Mattawamkeag where it is interchanged to the Guilford system. Guilford delivers the containers to its terminal in Ayer, Massachusetts. At least one steamship line currently is delivering sufficient containers on a weekly basis for expedited train service to permit second morning arrival at Ayer, 48 hours faster than delivery via New York. This routing has assumed increased importance with the demise of major steamship line calls at Boston. The portion of this route from Mattawamkeag to Ayer is not cleared for double-stack operation.

Guilford Waterville. Guilford continues to provide intermodal service to its terminal in Waterville. Intermodal service was developed between Worcester, MA and Waterville in the early 1990s in concert with Conrail. Over a period of several years this traffic grew to a lift count of approximately 14,000 annually. However, with the break-up of Conrail between Norfolk Southern and CSX, traffic dropped significantly. Guilford has developed alternative service routings in concert with Norfolk Southern, nonetheless traffic has not returned. However, with improving service levels on CSX and Norfolk Southern, Guilford expect to be able to recover and grow the intermodal business.

Guilford no longer operates separate intermodal service between Worcester and Waterville but rather operates daily train service as required, and handles any intermodal traffic in that service.

Conrail Break-up

The break-up of Conrail between CSX and Norfolk Southern resulted in service disruptions throughout the area served by the two railroads. Though neither railroad physically served Maine points, both did by extension through their connections with the Guilford system. Two years after the break-up, both systems appear to have stabilized at business levels previously enjoyed by the three predecessor railroads.

The main impact has been in the intermodal arena. One area has been the growth of international traffic at Auburn that was not impacted by the service problems associated with the break-up. While there certainly were a variety of factors involved in this switch, such as port call preferences, it would appear that the service problems resulting from the merger did have some impact in the selection of the SL&A, Canadian National routing.

The negative aspect of the Conrail break-up has been the loss of a significant volume of traffic handled by Guilford from Worcester, MA to Waterville. It appears that CSX essentially de-marketed this segment of traffic, at least for the present. Guilford has made efforts to develop alternative routings, and continues its efforts to rebuild this traffic.

Ports

For the last quarter century, the Maine DOT has operated under a three-port strategy for concentrating public investment in deep water port access; the three ports designated for growth under this strategy were the Ports of Portland, Searsport, and Eastport. Recognizing the regional economic benefits provided by efficient marine port operations, The Maine Port Authority (MPA) was reactivated in the late 1990s to help stimulate economic growth through the development of improved rail and marine facilities throughout the State. The Port Authority's enabling legislation has allowed it to utilize public/private partnerships to encourage economic development efforts at port facilities – a tool not available to MDOT. The Port Authority's immediate goal was to oversee the redevelopment of the Mack Point facility at the port of Searsport. As this redevelopment project is in the process of being implemented, the Port Authority has begun to turn its attention to economic development efforts at other key locations throughout the State.

The port of Portland is the only operating container facility in New England other than Boston. The Port currently has indirect access to the interstate highway system. It also has rail access to the Guilford and St. Lawrence and Atlantic Railroad nearby, and the ability to serve Panamax vessels. Container operations at the port are expected to experience continued growth in the near future as SPM Container Lines has recently deployed a new 5,000-ton container vessel. The ship, which has 40 percent more cargo space than SPM's previous vessel, provides container service for Hapag-Lloyd and other carriers between Boston, Portland, and Halifax, Nova Scotia. MDOT recently purchased a \$2.5 million container crane for the port of Portland to facilitate the loading and unloading of this vessel and to attract other large container vessels to the port. Further enhancing the ability for growth in container operations is the Ocean Gateway Project. This project aims to take advantage of Bath Iron Works (BIW) operations shifting from its Portland facilities to its redeveloped facilities in Bath. This shift will have important effects on container operations in Portland. First, the removal of the state-owned dry dock (which was being leased by BIW) and its sale to Croatia will allow passenger service, including cruise ship and ferry operations, in Portland to shift from their current location to the vacated BIW facility. This shift will allow the International Marine Terminal to be converted into a dedicated container and roll-on/roll-off (ro/ro) facility. The port of Portland is also the third largest oil terminal port on the U.S. East Coast. It also should be noted that Merrill's Marine Terminal has recently generated a proposal to sell its facility to the Maine Port Authority and then operate the facility under a license agreement from the Maine Port Authority.

The port of Searsport primarily handles bulk and break-bulk commodities through the Sprague Energy Terminal at Mack Point. Operations at the Mack Point facility are expected to be enhanced by two developments. The first is a unique public-private partnership between the Maine Port Authority and Sprague Energy. Through this partnership, the Maine Port Authority will oversee the construction of a new cargo pier, while Sprague will invest in new cargo handling equipment and storage facilities. The resulting facility will improve operations and enhance Mack Point's prominence as a gateway for products to and from the provinces of Atlantic Canada, Ontario, Quebec, and the U.S. Midwest. The relationship between the Maine Port Authority and Sprague Energy is unique because the cost of the newly constructed cargo pier will be paid back by Sprague via a cargo handling fee. This handling fee will eventually be used by the Maine Port Authority to aid in the development of port and rail facilities throughout the State. The second is a proposal to transfer ownership of a Department of Defense surplus fuel farm to the Maine Port Authority allowing more land and facilities to be available for future development.

The port of Eastport commenced operation in 1981. The port's primary customer has been Georgia Pacific, which exports value-added forest products. Georgia Pacific was recently purchased by Domtar, which led to uncertainty about future cargo moving through the port of Eastport. Eastport is the deepest natural port in the United States, able to accommodate drafts of up to 64 feet, and is also the closest U.S. port to Europe. A dual terminal at Estes Head, with the ability to simultaneously berth ships of 500 and 900 feet, opened in 1998. The port of Eastport lacks direct rail access. The closest rail head is 17 miles away at the Ayers Junction of the state-owned Calais Branch Railroad. Through an MDOT grant, the feasibility of establishing one or more rail-to-truck trans-load facilities along the Calais Branch Railroad was studied. The study concluded that the construction of an inland trans-load facility along the Calais Branch Railroad may lead to slightly increased freight traffic through the port of Eastport. It also was determined that upgrading the existing Calais branch to industry standards would cost \$75 million dollars.

Airports

Air freight is a relatively small component of Maine's current freight transportation system, but it is one that is experiencing rapid growth (7.0 to 10 percent annually). As air freight generally moves in the cargo holds of passenger aircraft, most air freight activity is concentrated at major passenger airports. The one exception is overnight delivery services, such as FedEx and UPS, which operate their own aircraft and often operate out of airports with low levels of passenger congestion and ample room for growth. Air freight is especially important for the transportation of low-weight/high-value commodities, such as semiconductors, and of perishable commodities, such as seafood. These two commodities are important components of the Maine economy and rely on air cargo services for shipment to inland and overseas destinations. Europe, for instance, experiences high demand for lobsters during the Christmas season that must be met using air transportation. Air freight in Maine moves primarily through the Portland International Jetport, the Bangor International Airport, and the Auburn-Lewiston Municipal Airport.

The Portland Jetport is situated on 700 acres three miles from downtown Portland. Both FedEx and AirBorne Express operate freight facilities at the airport. A package of improvement projects, including runway improvements and the construction of new

freight facilities near the airport's access road to streamline mail and cargo operations, is planned for this airport.

The Bangor International Airport, located along I-95, operates the one of the longest runway (over 11,000 feet) in the Eastern U.S. and is an alternate landing site for the Space Shuttle. The airport also has over 30,000 square feet of warehouse space. GE Power Systems, which operates a facility at the airport employing over 500 people, has recently announced a major expansion of its Bangor facility that will result in 150 to 160 new jobs. Telford Aviation, in partnership with Volvo Air, also is developing an aircraft maintenance facility at Bangor.

The Auburn-Lewiston Municipal Airport is a small airport that handles corporate, charter, recreational, and cargo activities. Its air freight activities are located near the Industrial Airpark, which is located in close proximity not only to I-495, but also to the Auburn-Lewiston Intermodal Facility. Major tenants of the Industrial Airpark include UPS, Applicator Sales and Service, a wholesale distributor of building materials, and Superior Carriers, a trucking company specializing in bulk transportation. The Auburn-Lewiston Airport has programmed several freight improvement projects, including the rehabilitation and expansion of aprons, the installation of a parallel taxiway, and the purchase of snow-removal equipment.

Pipelines

Freight transported by pipeline also makes up a small percentage of overall freight movements within Maine, normally accounting for approximately 9.0 percent of total tonnage shipped within the State. Pipeline movements in Maine are made up of crude oil arriving at the port of Portland, the majority of which is transported by Portland Pipe Line Corporation; and natural gas transported by the Maritimes and Northeast Pipeline and the Portland Natural Gas Transmission System (PNGTS).

Pipeline shipments of crude oil are dominated by the Portland Pipe Line Corporation in South Portland. Crude oil arriving at the port of Portland is transported via a 520-mile 24-inch mainline running between South Portland and the U.S./Canadian border crossing near North Troy, Vermont. From there, the crude oil is transferred to a Canadian pipeline that provides service to Montreal, Quebec and Sarnia, Ontario.

The Maritimes and Northeast Pipeline opened in 1999 and transports natural gas from reserves off Sable Island, in the vicinity of Nova Scotia. The pipeline is primarily owned and operated by the Duke Energy Corporation, with other major sponsors, including Westcoast Energy, Inc., the Exxon Mobil Corporation, and NS Power Holdings, Inc. The Maritimes and Northeast Pipeline is divided into two sections. The first is a 205-mile section running from Westbrook, Maine to the U.S./Canadian border in Baileyville, Maine. This section of pipeline contains two compressor stations in Baileyville and Richmond, Maine. The second section is a 100-mile section running from Westbrook, Maine to Dracut, Massachusetts. This section of pipeline is jointly operated with the Portland Natural Gas Transmission System.

The Portland Natural Gas Transmission System also was completed in 1999 and provides natural gas service to the Western and Southern regions of Maine. This pipeline also is

divided into two sections. The PNGTS North connects with the Trans Quebec Pipeline at the Canadian border and also provides service between Albany, Rumford, and Jay, Maine. The PNGTS South connects with and is jointly operated by the Maritimes and Northeast Pipeline, providing service from Westbrook, Maine and points south.

■ 3.4 Examples of the Logistics Patterns of Maine Shippers

More than 200 shippers, receivers, and transportation service providers that serve Maine were surveyed and interviewed. This was a critical step because it provided anecdotal explanations for the factors that influence why freight moves the way it does, what service characteristics are most important, and what types of transportation improvements would be beneficial to shippers/receivers. This compliments the commodity flow analysis, which describes freight flows for Maine in an aggregated form.

For example, the commodity flow analysis describes the volumes and modes of freight commodity as it moves into and out of Maine. Although it encompasses total shipments, it does not illustrate the specific logistics patterns used by shippers and receivers. The transportation decisions made by shippers and receivers are based on a variety of factors. The evaluation of a shipper's supply chain begins to identify and explore these factors. The following describes the types of attributes included in this analysis.

Identification of plants and production site locations. This may include several component plants and a final assembly plant. These sites may be spread across a state, a country, or the world. Understanding the complexities of this infrastructure significantly enhances the freight profile.

Identification of key commodities. The primary goods moved by a company are identified. This differs from the two- or three-digit STCC commodity groups analyzed by the commodity flow analysis. Both raw materials used as inputs in the manufacturing process and final goods sold to consumers, are detailed.

Identification of suppliers. The specific locations of a manufacturer's suppliers are provided. This usually includes details about why certain suppliers are used (cost, location, quality, etc.). In some instances, such as with some automobile manufacturers, suppliers are required and/or encouraged to locate nearby.

Definition of the network of distribution centers/warehouses and retail locations. Once the supplier and production activities are detailed (inbound flows), the network by which the manufacturer distributes its final products must be described. In some cases distribution centers and warehouses are used as intermediaries between the production process and the retail sales. In other cases, customized orders are produced and delivered directly to customers. This diversity creates a variety of transportation demands.

Transportation services used to move inbound and outbound freight. For each of the two previous items, the company will define the current transportation services used to satisfy customer service requirements. They will define when truck, truck/rail intermodal, air, or ocean services are used and why. For example, a manufacturer

may have a customer that has stipulated that under no circumstances is rail or inter-modal rail service to be used. In another example, the customer may have insisted on the cheapest available service, with less concern with on-time delivery. These are the types of factors that shippers must deal with on a customer by customer basis, making the selection of service unique to the company's needs.

Identification of key routes used. As the transportation services are defined, key routes will be defined. Some manufacturers are heavily involved in the routes selected, while others may outsource the entire transportation function, leaving the routes up to the professional transportation service provider.

Factors leading to the current plant location and future expansion plans. The manufacturer explains why plants were built in existing locations. What is it about the region that makes it a competitive place to do business? Is it still competitive? Are there expansion plans and if so, will they be in this region? This information is valuable to planning agencies because it helps identify what a region is doing right or wrong to attract businesses.

Identification of key operational characteristics. The key operating characteristics that the company requires are defined. Some companies need access to specific transportation services. Coal-based utility companies typically depend heavily on direct rail service. This means that a siding at the plant is necessary. Other companies need access to international markets. This requires the use of waterborne vessels and aircraft. In addition to the modal decision, companies may require just-in-time delivery of raw materials and/or finished goods. In some instances, the low-cost option is the primary factor.

Suggestions for transportation system improvements. The final item that this process provides is access to the freight transportation system users. They have perspectives different from the general traveling public and usually from planning agencies, given the historical emphasis placed on passenger transportation planning initiatives. Therefore, the opportunity to discuss future infrastructure needs and developments with the freight movers is invaluable.

Sample Logistics Patterns in Maine

As MDOT continues its freight transportation planning activities, it will become increasingly important to involve and coordinate with the economic development agencies responsible for retaining and attracting businesses to the State. Equally important is the need to continue to build relationships with the transportation providers operating in Maine and the shippers and receivers they serve. As public policy continues to be developed to address the freight transportation system, ongoing input from these stakeholders is critical. This section presents summaries of a few selected examples of supply chains in Maine. The similarities and differences between the different operations will help illustrate the diverse set of needs presented for freight transportation planning.

Cement Manufacturer

The first logistics example is of a cement manufacturer located in Maine. This operation is characterized by the manufacture of several products, including Portland Cement, ready-

mix concrete, agricultural lime, and crushed stone aggregates. Figure 3.17 and Table 3.2 describe and illustrate the operation. Both the transport of raw materials and finished products utilize multiple modes of transportation. Trucks are used to acquire raw materials, deliver products and transfer shipments utilizing other modes. Rail is used for inbound and outbound shipments via a rail siding at the plant. The outbound moves by rail are part of a rail/water intermodal move that travels from the plant by rail to Rockland where water transportation is used to deliver products to Boston. Water also is used for inbound products in combination with truck through Searsport. This company operates based on a warehoused inventory of both raw materials and finished products.

The use of multiple modes of transportation illustrates this company's reliance on a diverse set of transportation services. Given the materials and products being moved, a single mode does not accommodate the service requirements of the suppliers or the customers. Having access to truck, rail, and water is critical for this company. It is not surprising that the company ranked highways, intermodal rail, rail, and truck size and weight as key issues for their future competitiveness.

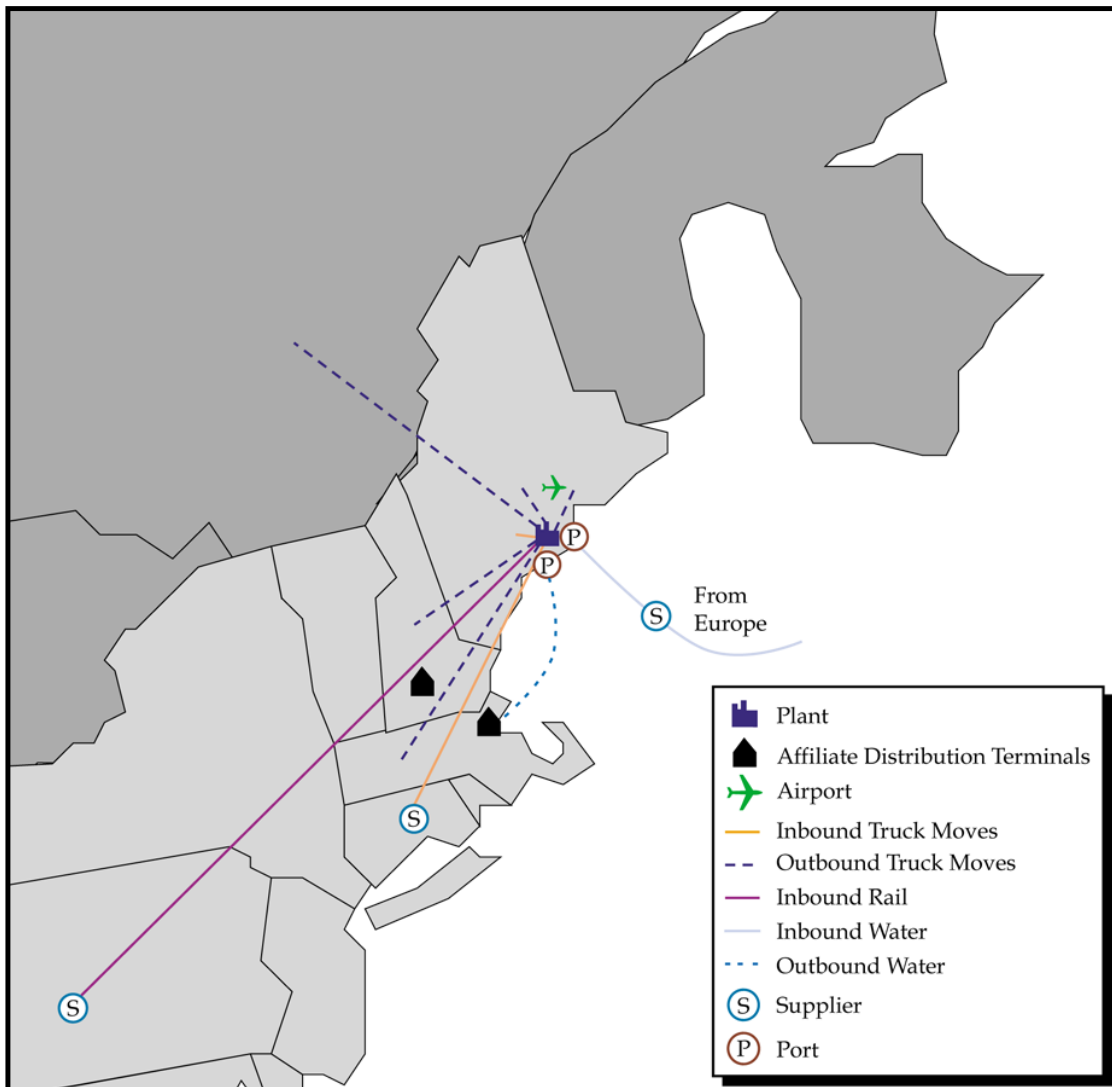
Figure 3.17 Illustration of Cement Manufacturer Logistics Patterns

Table 3.2 Description of a Cement Manufacturer

Operations	<ul style="list-style-type: none"> • Manufacturer of Portland Cement, ready-mix concrete, agricultural lime, and crushed stone aggregates. • Facilities are located in ME. Affiliate facilities are located in NH and MA. • Company employs more than 200 workers.
Markets	<ul style="list-style-type: none"> • Suppliers are located in ME for sand, CT and Germany for iron, PA for coal, Spain for gypsum, and Venezuela for petroleum coke. • Key markets consist of ME and NH for lime; ME, NH, MA, and Quebec for cement; and ME for concrete and crushed stone aggregates.
Modal Dependence	<ul style="list-style-type: none"> • Several modes of transportation are used for both inbound and out-bound operations. • Trucks are used for pick-ups and drop-offs of products at customer locations, plants, and intermodal moves. • Port of Searsport is used for imports of raw materials from abroad, and Rockland is used for outbound shipments of products to Boston. • Air service is used occasionally out of Bangor, Portland, and Boston. • Rail is used for carload shipments of inbound materials to plant which has its own siding, and bulk trans-load service is used for out-bound products as a connection to port facilities in Rockland.
Service Requirements	<ul style="list-style-type: none"> • An inventory of products and materials is maintained so transportation services are not serving a just-in-time environment.
Future Modal Diversion	<ul style="list-style-type: none"> • Always willing to consider use of other modes based on level of service and price offered.
Use of Technology	<ul style="list-style-type: none"> • Company maintains own web site. • E-business tools are used to source, quote, and purchase goods and services. • Plant is equipped with automated controls.
Comments	<ul style="list-style-type: none"> • Back haul is an issue as there are limited opportunities for securing loads to be brought back into ME. • Improvements to highways, intermodal rail, rail, and truck size and weight policies all ranked very important to operation. • Port of Searsport has high terminal costs and lacks economical direct rail access from the plant. • 80,000 pound weight limit on Interstate is an operational issue. • Lack of rail service, lack of rail competition, and rail costs are all concerns.

Paper Manufacturer

The second logistics example is that of a paper manufacturer located in Maine. This operation is characterized by the manufacture and distribution of roll paper. Figure 3.18 and Table 3.3 describe and illustrate this operation. This example also includes the use of multiple modes for both inbound and outbound freight movements. Water is used in combination with rail for delivery of oil to the mill, moving through Searsport and then on rail. Water also is used for exports. Rail is used for both inbound movements of wood chips, and outbound movements of roll paper. This is all carload service, as rail intermodal has not proven useful given availability and condition of equipment, and product damage. Truck also is used for both inbound movement of round wood and outbound movements of roll paper. And finally, air is used occasionally for transport of product samples for new customers.

Service requirements are more of an issue to this company, as it operates on a just-in-time schedule. It strives to minimize inventory while ensuring the mill can keep operating, while fulfilling orders on time. This company is working to move 80 percent of its product by rail by the end of 2001. As such, the improvement of rail service, and truck size and weight policies were at the top of the list for MDOT priorities.

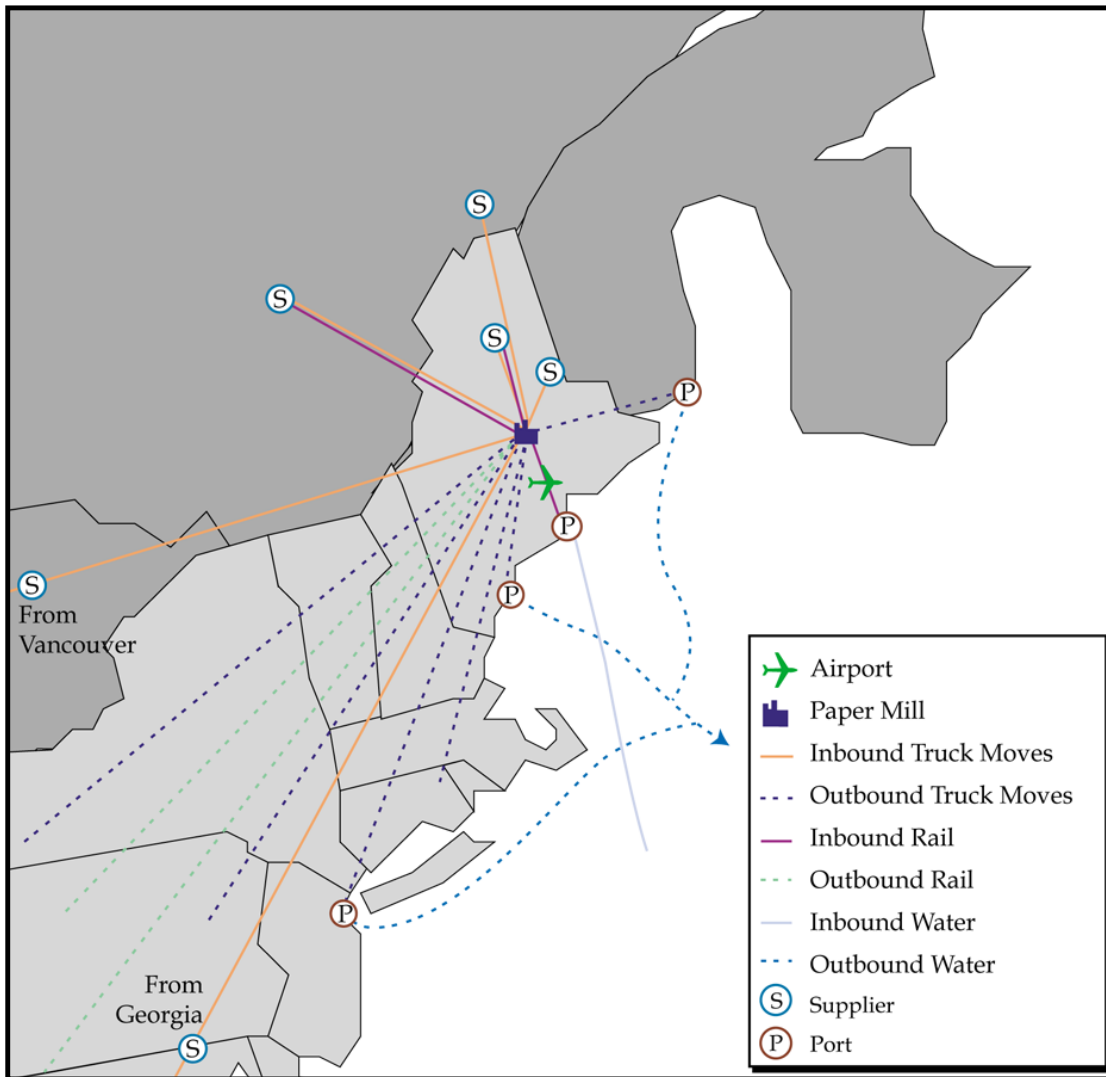
Figure 3.18 Illustration of Paper Manufacturer Logistics Patterns

Table 3.3 Description of a Paper Manufacturer

Operations	<ul style="list-style-type: none"> • Manufacturer of paper rolls. • Company is based in ME and employs more than 500 workers.
Markets	<ul style="list-style-type: none"> • Suppliers are located in ME and Quebec for wood chips, in Vancouver for craft, and GA for Clay. Oil is received through the port of Searsport. • Markets are located throughout the U.S. for paper rolls.
Modal Dependence	<ul style="list-style-type: none"> • Several modes of transportation are used for both inbound and outbound operations. • Trucks are used for inbound movements of 35,000 cord of round wood per month; and 20 to 25 outbound truckloads per day. • Carload rail service is used for inbound movements of 30,000 tons of wood chips per month; and 15 carloads per day of outbound paper. • Water and rail are used to deliver oil to the mill, coming by water into Searsport and then onto rail for delivery to the mill. For exports, the ports of St. John, New York/New Jersey, and Portland are used. • Air service is used to receive parts and ship out trial paper samples to new customers. Bangor is primary airport, but also use Portland, Boston, and New York.
Service Requirements	<ul style="list-style-type: none"> • A combination of just-in-time and warehousing is used to manage raw materials, and just-in-time is used exclusively for finished products. As a result, having reliable transportation service is key to the operation and a failure could result in an interruption in mill operations.
Future Modal Diversion	<ul style="list-style-type: none"> • Company is working to have 80 percent of all outbound roll paper shipments moving by rail in 2001. • Currently does not use any intermodal rail due to poor equipment and product damage in past (wet paper).
Use of Technology	<ul style="list-style-type: none"> • Company maintains a web page but does not use any e-business services at this time. Would consider using such services in the future. • Rail shipments are tracked electronically via a third-party system.
Comments	<ul style="list-style-type: none"> • Improving rail service and addressing truck size and weight policies were the two issues ranked very important. • Key concern was what to do about BAR. • Widening of the Maine Turnpike is very important. • Road postings in the spring is a problem. Secondary roads could be maintained better.

Parcel Delivery Service

The third logistics example is of a parcel delivery service located in Maine. This operation is characterized by collection and distribution of parcels from a worldwide network. Figure 3.19 and Table 3.4 describe and illustrate this operation. This example, like the first two, illustrates the use of multiple modes for both inbound and outbound moves. However, this is a service-based company, providing time sensitive delivery of high-value parcels, and relies on air cargo service. Inbound and outbound shipments are collected from local markets by truck, and then are consolidated at the terminal for further transport. Air is used to move shipments between Auburn and Bangor, and Auburn and Manchester, New Hampshire. Intermodal TOFC service is used to move loads between Auburn and Worcester, Massachusetts, and between Auburn and Illinois. In addition, moves to and from Canada are consolidated through Syracuse, New York. Each of these moves connects the Auburn-based terminal with other gateways into the international network.

The company has advanced technology that is used to track shipments and system performance. This includes a combination of bar codes, readers, and the company's web-based system. This allows real-time response to customer inquiries regarding shipment status. Impacts that the weather has on the conditions of highways, causing reduced speeds, is a major concern to this company, as timing is very important. This company also uses double trailers. Improving highways and air cargo services, combined with changing truck size and weight policies are of key concern to this company.

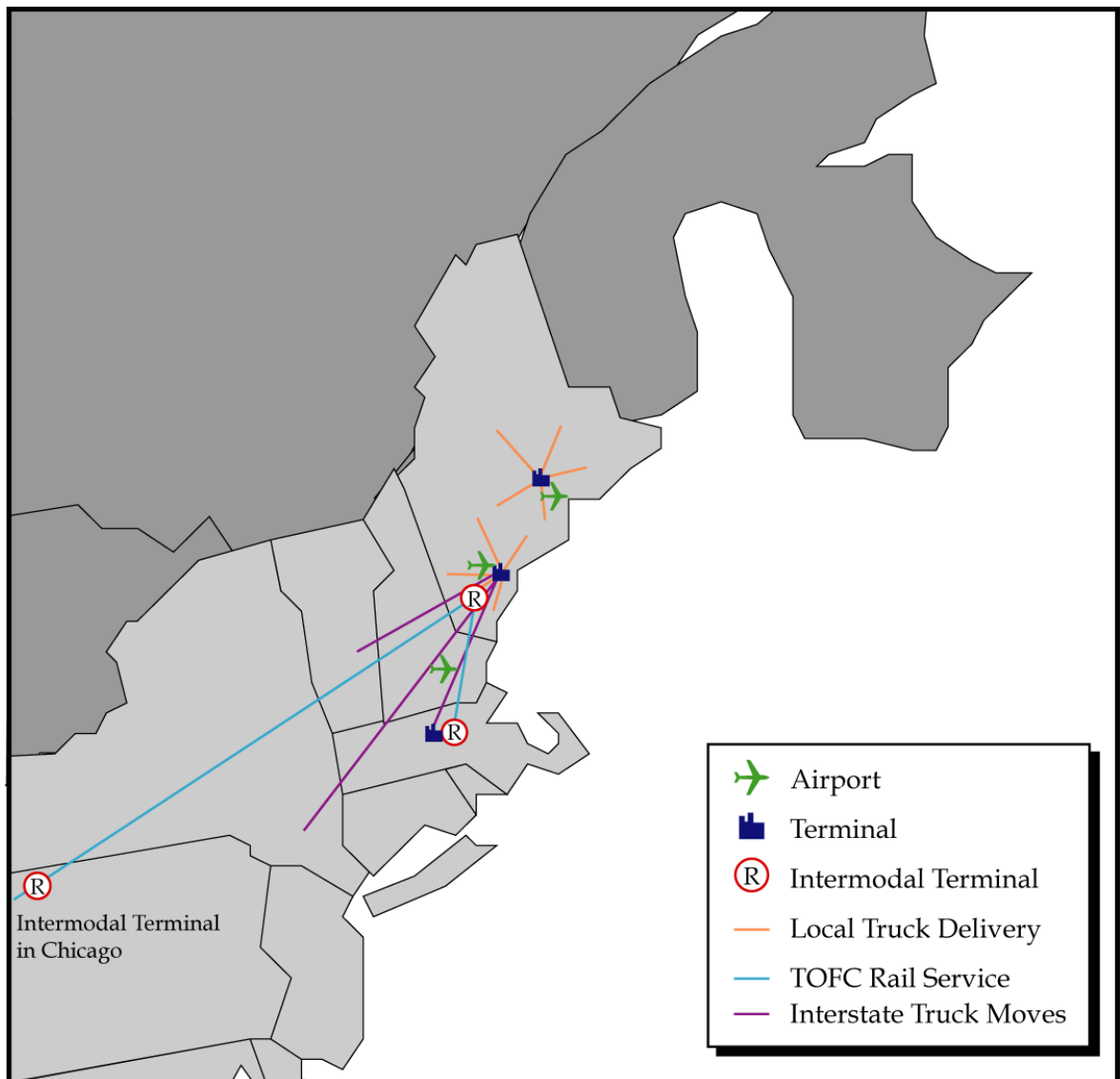
Figure 3.19 Illustration of Parcel Delivery Service Logistics Patterns

Table 3.4 Description of Parcel Delivery Service

Operations	<ul style="list-style-type: none"> • Company provides worldwide package delivery services. • Company employs more than 500 workers.
Markets	<ul style="list-style-type: none"> • Inbound movements consist of packages destined for ME from anywhere in the world. • Outbound movement consists of packages originating in ME for destinations anywhere in the world.
Modal Dependence	<ul style="list-style-type: none"> • Several modes of transportation are used for both inbound and outbound movements. • Air is used for shipments into and out of Auburn to and from Manchester, NH and Bangor. • Intermodal rail is used for TOFC service between Auburn and Worcester, and Auburn to Illinois. • Private fleet of trucks is used for intrastate deliveries in western ME and for movements between Auburn and Worcester. • Movements to/from Canada move through Syracuse.
Service Requirements	<ul style="list-style-type: none"> • Time sensitive, reliable service is key to this operation, as parcel delivery is a time sensitive business.
Future Modal Diversion	<ul style="list-style-type: none"> • There are no plans to change the existing mix of modes used. Rail service is unacceptable for additional use.
Use of Technology	<ul style="list-style-type: none"> • Company maintains its own web page. • E-business practices are used; shipments are tracked using bar codes, scanners, and the web site.
Comments	<ul style="list-style-type: none"> • Improving highways, improving air cargo services, and changing truck size and weight policies were ranked as very important. • Impacts of weather on roadway reliability are of concern. • ME has a strong transportation infrastructure overall. • Question of why fleets of small trucks are required to stop at weigh stations.

Overview of Logistics Patterns

These three logistics examples illustrate the differences that exist in the Maine market place. A common thread among all three is the need and desire to meet the customers' service requirements while preserving the security and quality of the products. The differences among these examples, and in reality between the industries they represent, illustrate the need in Maine for a balanced freight transportation system. It also is important to recognize that although many believe shippers are reluctant to use modes other than truck, it is clear that shippers will use the best service alternative for the price to meet their customers' expectations.

Each of these companies currently is using multiple modes of transportation to serve their operations. This ranges from heavy reliance on air cargo services, to dependence on carload rail service. This is not an exhaustive set of logistics and transportation uses; these are merely examples of three very different industries that illustrate how the freight transportation system is used in Maine. The key point to be made here is the fact that each of these companies depends on various components of the system to support their business. For example, the paper mill is moving towards 80 percent of outbound traffic moving by rail carload service. If there were an interruption in this service, the operation would be significantly impacted, as switching a heavy, bulky commodity from rail to truck has significant cost and traffic implications. The parcel company depends on air cargo service to provide next-day or two-day delivery service. If the air cargo system were interrupted, it would be impossible to provide certain services. These specific examples of service interruptions show that the transportation infrastructure is very important for economic prosperity. Each component impacts a company differently, but all companies benefit from a well-balanced, effective transportation system.

■ 3.5 Role of the Internet for Freight Transportation

The Maine Department of Transportation's Office of Freight Transportation (OFT) has identified several issues (that are being addressed in this update of Maine's Integrated Freight Plan (IFP)). One such issue is empty back hauls. As Maine ships out more goods than it imports, there are a significant amount of "empty miles" being traveled on Maine's transportation network, increasing transportation costs for shippers, carriers, and consumers. Advancements in technology, however, are anticipated to provide new tools for use by Maine businesses in managing their transportation and distribution functions while making these functions more efficient. Such advancements, including the use of the Internet to provide load-matching services and identify back hauls, and the use of advanced Intelligent Transportation System (ITS) applications, such as vehicle tracking, routing, and communications systems, may provide Maine businesses the opportunity to improve their efficiency and lower their overall freight transportation costs.

Internet-Based Load-Matching Services

The Internet has changed the way information is managed, especially in the trucking business. Gone are the days when freight forwarders were the sole liaisons between buyers and sellers, matching shippers who buy transportation services, with carriers, who sell them. The Internet is now acting as an electronic liaison between buyers and sellers of transportation services, matching loads and available carriers, scheduling pickups and deliveries, providing electronic billing and other paperwork services, and even providing load tracking information. Web-based load matching services give shippers and carriers direct access to capacity and load information, allowing shippers to take advantage of volume discounts and competitive bid processes while allowing carriers to quickly and easily identify loads to prevent empty back hauls. These services are leading to greater efficiency and lower costs for both shippers and carriers.

There are many web sites that provide load-matching services. Appendix E provides a brief listing of the web-based load-matching sites currently available. MDOT does not

endorse any of these sites. They are provided only for information purposes and as an illustration of the services that exist today.

Many of the sites listed in Appendix E are merely searchable databases of available loads and equipment – the Internet is simply the medium through which this information is accessed. By allowing shippers and carriers to inexpensively and quickly post and search for loads or trucks (like a bulletin board at a truck stop), these sites can offer shippers and carriers the basic benefits of Internet-based load-matching, i.e., volume discounts and competitive bid processes (for shippers) and quick identification of back hauls (for carriers). After a load (or a truck) is found, however, the remainder of the shipper/carrier transactions, including agreeing on terms, scheduling pick-ups, completing paperwork, tracking shipments, and finalizing payments, are completed off-line, normally via phone or fax. Trucking companies can incur significant administrative costs for the completion of these off-line transactions.

To better capitalize on the benefits offered by the Internet and achieve significant operational benefits and reduced transportation costs, Maine companies should investigate the use of web-based load-matching sites that do more than just offer searchable load and truck databases. There are many sites that not only provide load-matching services, but also other amenities, such as on-line shipment tracking and electronic payment and paperwork services. The use of such services can help Maine companies improve their operational efficiency and hence their profitability.

Maine Department of Transportation Internet Initiatives

The Office of Freight Transportation has undertaken two initiatives in the last year to make better use of the Internet for the dissemination of freight-related information. The first initiative consists of the development of a freight transportation web page within the existing MDOT's web page. This site is and will be used for the dissemination of information and data on the OFT's freight programs and projects. For example, the products produced as part of this Integrated Freight Plan will be posted on the web page for review by interested parties. It provides the OFT with a mechanism to reach a large audience of freight stakeholders with minimal cost and effort. Stakeholders will be able to review reports posted there, access information on community meetings, legislative issues, and submit comments or recommendations to the OFT. Given the wide use of the Internet by both individuals and businesses, this web site should provide OFT with the ability to connect with the majority of stakeholders.

The link for this page is: <http://www.state.me.us/mdot/freight/homepage.htm>.

The second initiative undertaken by the OFT was for, and in cooperation with, the Maine Port Authority. This web site augments much of the modal data provided by the OFT's web site but places a greater focus on the marine facilities and interconnections. The site provides a comprehensive listing of major marine terminal facilities along the coast and their interconnections with inland transportation modes. There is also a directory of service providers (terminal operators, pilots, stevedores, suppliers, etc.) for each port. In addition to its commercial functions, the site provides access to current data on weather

and sea conditions, safe boating information, and a statewide database of marinas, repair facilities, and suppliers for recreational boaters and the marine tourism industry.

Conclusions

Technology is being used to facilitate more efficient and cost-effective transportation for the freight industry. As with many start-up Internet companies, competition is fierce and there are many failures. However, as shippers and carriers continue to strive for excellence in the movement of freight, technology will continue to play a significant role in the development of advanced logistics solutions. As discussed earlier, a major goal for carriers operating in Maine is to find better ways to identify back-haul loads. As 85 percent of survey and interview respondents indicated that Internet access is available at their companies, the web site currently being developed by the Maine Port Authority may present an opportunity for MDOT to assist carriers in identifying back-haul loads, resulting in lower transportation costs for Maine-based businesses. The future mix of private and public services will be based on today's successes and failures. If the private sector fails to make a profit from these types of services, but it is shown that they provide a real benefit, the role of the public sector will likely expand. If the private sector is successful at creating and maintaining Internet-based load matching services that are profitable and beneficial to users, then public sector involvement will likely diminish over time and re-focus on other identified areas.

4.0 Commodity Flow Patterns

A crucial component in the development of Maine's Integrated Freight Plan is an understanding of the types of commodities currently moving into, out of, and within the State; the modes on which those commodities are traveling; the reasons they are moving the ways they are; and how those movements are expected to change in the future. A quantitative commodity flow analysis provides the means to better understand the current and future commodity flow patterns affecting freight movements in Maine. Appendix D provides additional commodity flow analyses.

■ 4.1 Overview of Freight Flows

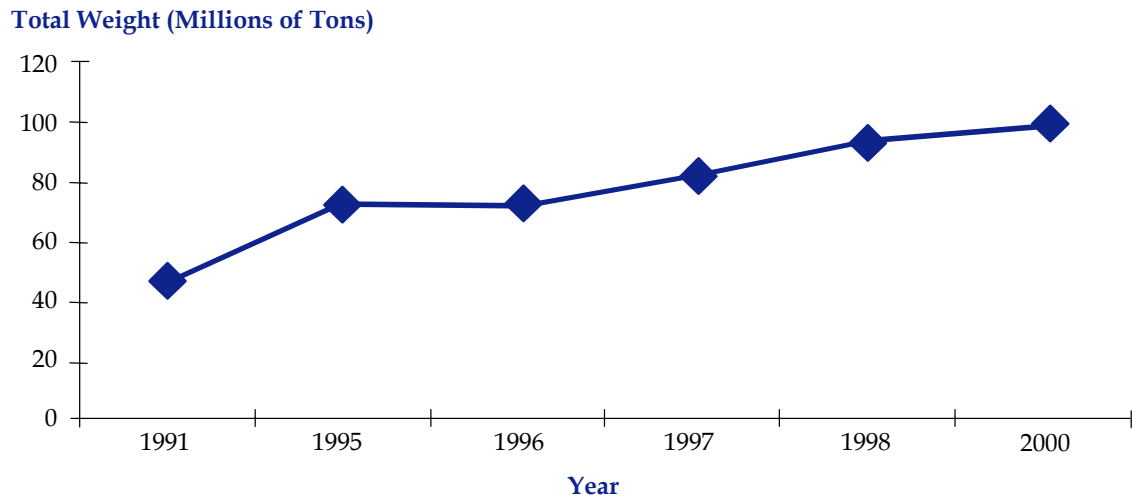
Freight flows into, out of, and within Maine saw steady increases throughout the 1990s. Nearly 102 million tons of freight were transported into, out of, and within Maine via the truck, rail, air, and water modes in 1998. Looking specifically at domestic flows, there was an increase of nearly 100 percent from 52.8 million tons in 1991 to 100 million tons in 2000. Figure 4.1 illustrates the growth in total domestic flows.⁴

Though not reported in the TRANSEARCH database, pipeline movements within Maine also experienced significant growth during the 1990s, increasing nearly 33 percent from 1991 to 1998, as shown in Figure 4.2.

Figure 4.3 shows Maine's freight movements by movement type:

- Intrastate (county-to-county) movements accounted for 64 percent, or 64.7 million tons.
- Interstate movements accounted for 24 percent, or 24.5 million tons.
- Canada movements accounted for 7.0 percent, or 7.4 million tons.
- Intracounty movements accounted for 5.0 percent, or 5.4 million tons.

⁴ This significant growth is based on the TRANSEARCH database, which was first purchased by MDOT in 1991 and has been purchased annually since 1995. It should be noted that this database is improved with each update. Therefore, the increase in tons is the result of growth in Maine freight flows in addition to improvements in the data.

Figure 4.1 Freight Flows in Maine, 1991-2000

Source: Reebie Associates.

Note: Domestic moves only.

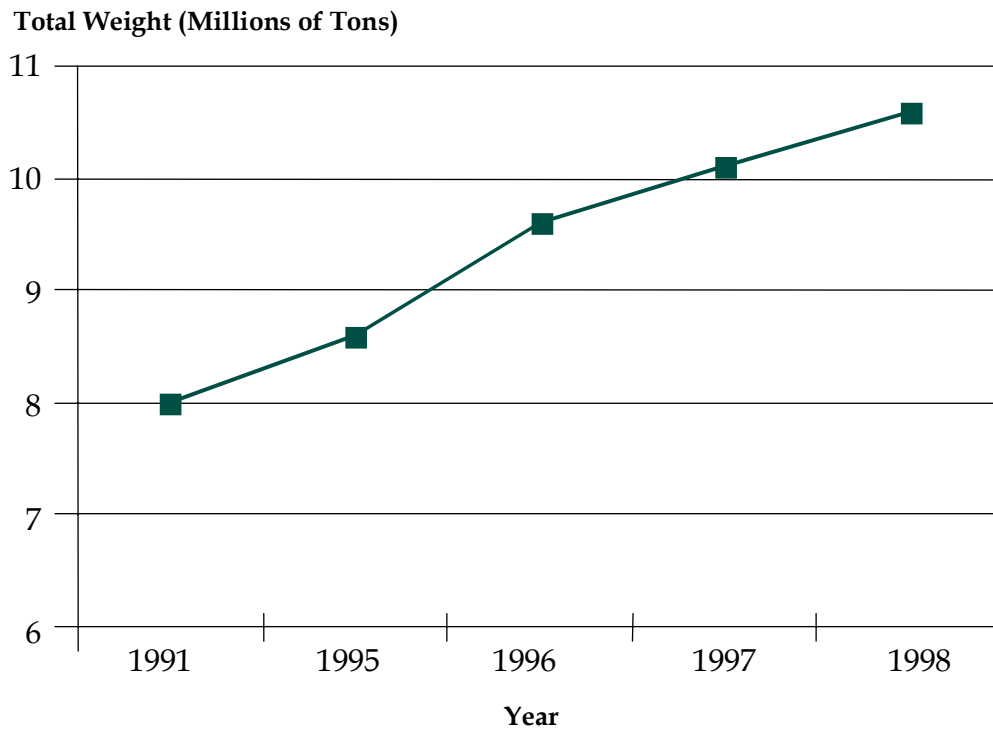
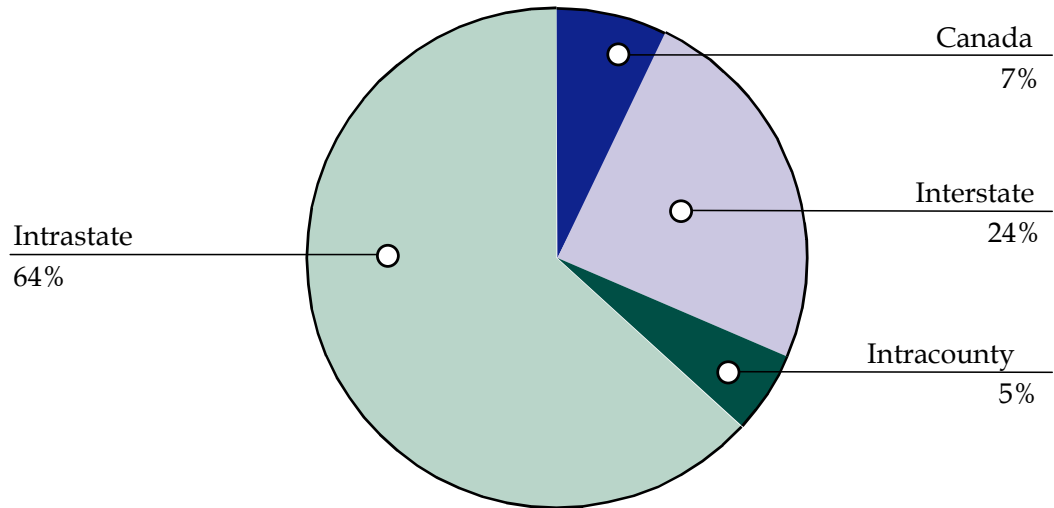
Figure 4.2 Total Pipeline Tonnage

Figure 4.3 Total Freight Flows in Maine by Type of Movement, 1998



In 2006, more than 126 million tons are expected to flow into, out of, and within the State and the split of these tons among the four movement types is expected to remain the same (i.e., 64 percent intrastate, 24 percent interstate, 7.0 percent Canada, and 5.0 percent intra-county). While the overall growth rate for all freight movements is expected to be 24 percent (3.0 percent annual), the anticipated growth rates of the individual movement types vary slightly. Table 4.1 shows the breakdown of these forecast tons by type of movement and their respective growth rates.

Table 4.1 Base-Year and Future Tons and Growth Rates by Movement Type

Movement Type	1998 Tons	2006 Tons	Overall Growth	Annual Growth
Intrastate	64,721,774	80,182,229	23.89%	2.97%
Interstate	24,474,839	30,373,301	24.10%	3.01%
Canada	7,399,338	9,158,628	23.78%	2.97%
Intracounty	5,383,849	6,695,152	24.36%	3.04%

Of the total amount of freight moving within Maine, approximately 31 percent (31.9 million tons in 1998, 39.5 million tons in 2006) have origins or destinations outside of the State. It is necessary to analyze these interstate and Canada freight flows by direction (inbound or outbound) to determine the patterns of these external movements and how they are expected to change.

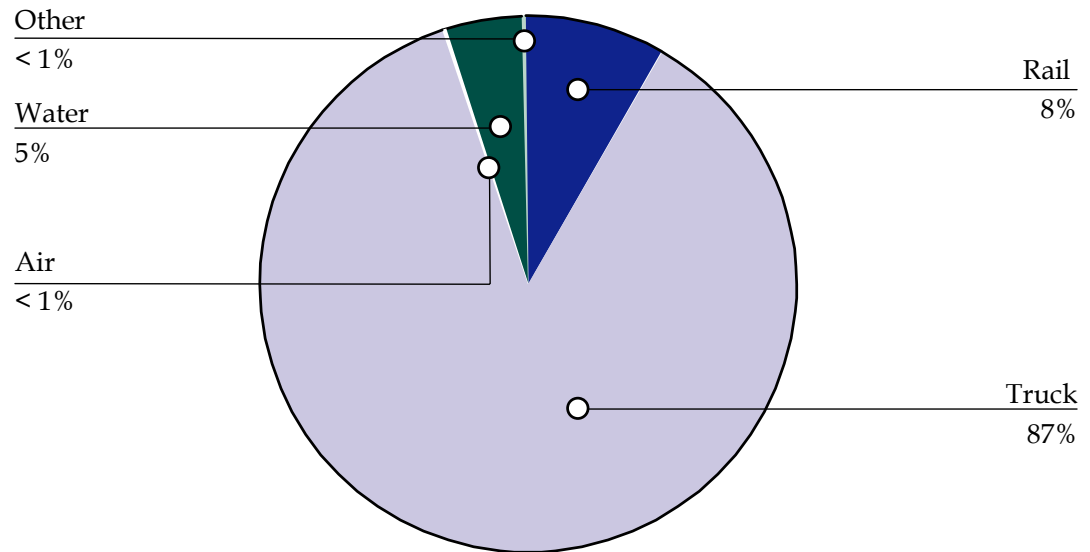
These summary statistics highlight two key points. First, the majority (69 percent) of Maine freight shipments is moving from point to point within the State. This may be the result of the redistribution of products being shipped into the State as well as the movement of products and materials between markets. Second, freight movements within Maine are growing at an average annual pace of 3.0 percent, though inbound shipments from other states and Canada are growing at a more rapid annual pace (3.15 percent and 3.20 percent, respectively) than other types of movements.

■ 4.2 Mode Split Analysis

It is important to analyze how freight is moving in order to understand modal dependence and traffic patterns. Like most states, Maine is dependent on trucks for movement of much of its freight, particularly those shipments that both originate and terminate within the State (intrastate and intracounty movements). Some movement types, however, particularly inbound freight shipments from other states and Canada, have a much more diverse mode split.

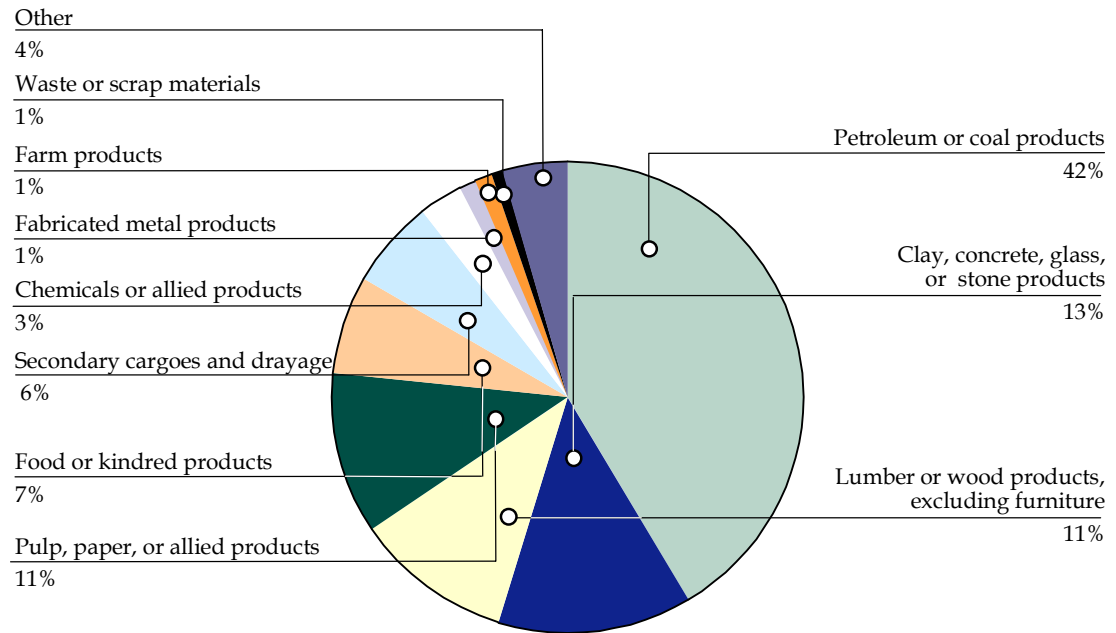
Figure 4.4 shows the mode shares for all movements into, out of, and within Maine in 1998. There is little change expected in modal shares between 1998 and 2006. Of all the freight moving on the Maine transportation infrastructure in 1998, 87 percent, or approximately 88.1 million tons, were moving by truck. While truck's relative mode share is expected to decrease to 86 percent in 2006, the overall tonnage of freight hauled by those trucks is expected to increase by 23.6 percent, totaling approximately 108.9 million tons.

The mode-split analysis reveals two key points for Maine. First, freight movements in Maine are heavily dependent upon the truck mode and will continue to be so in the near term. This is particularly true for intrastate and intracounty movements, 95 percent of which are by truck. Secondly, the mode split analysis indicates that inbound shipments to Maine have a much more diverse mode split than outbound shipments from Maine. This may be caused by shipments to Maine's marine ports or other intermodal facilities transferring modes for final delivery by truck to points within the State.

Figure 4.4 Mode Shares for All Movements within Maine, 1998

■ 4.3 Identification of Top Commodities

It is also important to understand the types of commodities being moved along Maine's freight transportation infrastructure. While the TRANSEARCH database provided commodity information at the four-digit STCC level, commodities were grouped and analyzed by two-digit STCC. Figure 4.5 shows the top commodities moving into, out of, and within Maine in 1998. The top four commodity groups in 1998 accounted for 77 percent of the total flows, or 78.1 million tons. These commodity groups consisted of petroleum or coal products (42 percent); clay, concrete, glass, or stone (13 percent); lumber or wood products (excluding furniture) (11 percent); and pulp and paper products (11 percent). In 2006, the same four commodity groups are expected to account for 76 percent of the total flows, or 95.7 million tons.

Figure 4.5 Top Commodities in Maine, 1998

The top commodity analysis highlights several key points for Maine. First, lumber and wood products and pulp and paper products are key commodities, reflecting Maine's dependence on one of its natural resources. These commodities are expected to remain important to Maine in the near-term future. Secondly, petroleum and coal products are also a very important commodity to the State; 10 percent (4.1 million tons) are shipped through Maine's ports, emphasizing their continued importance to the State. Third, construction materials, consisting of clay, concrete, glass, and stone products, are a major commodity being shipped throughout the State. These movements can be attributed to Maine's ongoing and new construction activities – key economic engines and crucial to the growth of the State. Finally, farm produces and food and kindred products are both key commodities, particularly outbound flows to other states and Canada, highlighting the importance of Maine's agricultural industry to the rest of the region.

■ 4.4 Impact of Freight Value on Commodity Flows

The analysis to this point has reported Maine's commodity flow patterns based on weight. This is the fundamental approach to a freight study, as the weight of commodities is important in understanding the ways in which freight vehicles are using the transportation system, such as bridge stress and pavement consumption. Understanding how freight vehicles travel along Maine's transportation infrastructure is critical when addressing factors such as congestion, capacity, infrastructure investment, economic development, and quality of life. To gain a more holistic picture of the characteristics of

freight movements within Maine, however, it is important to consider the value of the products being transported into, out of, and within the State. This is particularly important as heavy industry manufacturing has continued to decline nationally and regionally while being replaced by high-tech and service industries.

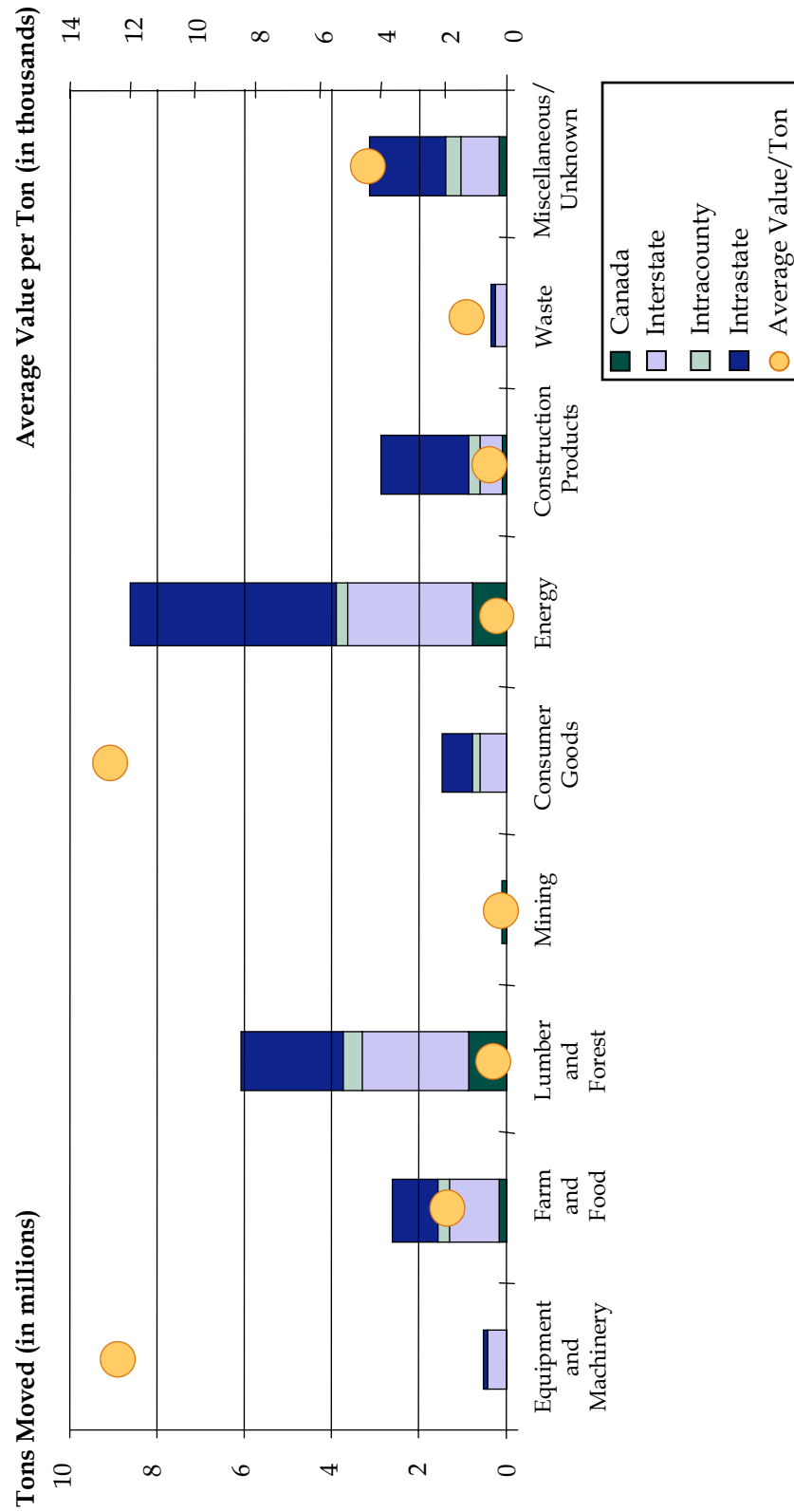
The TRANSEARCH commodity flow database purchased for this study did not include a value component. However, one of the products of the 1993 Commodity Flow Survey, developed by the Bureau of Transportation Statistics, provides estimates of value per ton for each of 38 commodities. These data were increased to reflect 1998 dollar values using information from the Department of Commerce and used to develop a comparison between the weight and values of commodities transported into, out of, and within Cumberland County. Cumberland County was chosen because of its diverse mix of commodity types and because it is the top importing county within the State, receiving 12.9 million tons of freight in 1998; an analysis performed on other Maine counties would show similar results. As can be seen in Figure 4.6, there are several types of products that have an inverse relationship between their value and their overall tonnage. That is, as the volume of the commodity (represented by the bars) decreases, its value per ton (represented by the circles) generally increases. Equipment and machinery and consumer products, for instance, have relatively low shipment volumes, but very high values per ton. Conversely, energy products (including petroleum) and lumber and forest products, two of Maine's most important commodities, have very low values, but large shipment volumes. Comparing the weight and value of different commodities is important when determining the economic significance of certain flows to a region or state. The importance of low-weight, high-value commodities will become better recognized when value is incorporated into the full analysis.

■ 4.5 Key Findings

Intrastate movements represent the single largest type of movements, accounting for 64 percent of all freight flows in Maine (across all modes). This is expected to hold true in 2006. In fact, 69 percent of the total freight flows in Maine (across all modes) occur between points within the State (intrastate plus intracounty movements). Again, this is expected to remain constant through 2006.

- Unlike other northeastern states, Maine exports more freight (14.1 million tons in 1998) to other states than it receives (10.3 million tons in 1998). The relative shares of interstate imports and exports are expected to remain the same in 2006.
- Unlike interstate shipments, Maine imports more from Canada (4.7 million tons in 1998) than it exports to Canada (2.7 million tons in 1998). The relative shares of these movements are also expected to remain the same in 2006.

Figure 4.6 Comparison of Weight and Value by Commodity Type



- Freight shipments are forecast to grow at an overall pace of approximately 3.0 percent per year between 1998 and 2006. Canadian imports are expected to grow the most rapidly (3.20 percent annually), while the slowest growth rate is predicted for Canadian exports (2.56 percent annually).
- Truck is the dominant mode of transportation for freight flows in Maine, representing 87 percent by weight in 1998. By 2006, truck's share is expected to decrease to 86 percent, with that 1.0 percent of freight traffic shifting to rail.
- 95 percent of the intrastate and intracounty movements occur by truck. This is expected to remain constant through 2006.
- The rail and water modes play a much larger role in interstate and Canadian shipments, particularly imports from these areas.
- The top commodity groups in 1998 consist of petroleum or coal products (42 percent); clay, concrete, glass, or stone (13 percent); lumber or wood products (excluding furniture) (11 percent); and pulp and paper products (11 percent) and account for 77 percent of the total flows, or 78.1 million tons. In 2006, the same four commodity groups are expected to account for 76 percent of the total flows, or 95.7 million tons. Again, these commodity groups consist of petroleum or coal products (41 percent); clay, concrete, glass, or stone (13 percent); lumber or wood products (excluding furniture) (11 percent); and pulp and paper products (11 percent).
- Food and kindred products and farm products are both important exports to other states and Canada.
- Cumberland County is the key importing county in the State, receiving 12.9 million tons of freight in 1998. Cumberland County is expected to remain the top importing county in 2006. Penobscot County is the top exporting county in Maine, exporting 9.6 million tons of freight in 1998. This County is expected to lead the State in exports again in 2006.
- Because of the terrorist attacks of September 11, 2001, it can be expected that future security measures and incident management may interrupt normal freight flow.

5.0 Findings, Conclusions, and Recommendations

This section presents the key findings, conclusions, and recommendations of the update to the Maine Integrated Freight Plan. The findings and conclusions are based on the analyses completed for each task. The recommendations have been developed in support of the findings and conclusions.

■ 5.1 Findings and Conclusions

The findings and conclusions are based on four areas: economy/demographics, transportation infrastructure, commodity flow patterns, and institutional issues.

Economy/Demographics

Maine's unemployment levels, population levels, and job growth trends have generally mirrored regional and national trends, though at slightly slower paces.

- At 4.1 percent, unemployment rates in Maine remain approximately the same as the national average, but are slightly greater than the regional average;
- Job growth in Maine is less than the U.S. average, but slightly greater than the regional average, led by strong growth in the service sector;
- Population growth in Maine is approximately the same as the regional average, but much slower than the national average;
- Maine's average wage is the lowest among the New England states and is only 81 percent of the national average; and
- Though manufacturing's share of employment within Maine dropped precipitously from 1980-1998, it has since leveled off, and manufacturing jobs within the State still pay higher, on average, than non-manufacturing jobs.

Though Maine is growing at a slower pace than the nation as a whole, these trends indicate that Maine took full advantage of the vibrant economy of the 1990s and should continue to maintain its position as a positive contributor to the regional, national, and international economy. Continued economic prosperity and growth will be dependent to a certain degree on Maine's ability to maintain and improve its transportation infrastructure.

Transportation Infrastructure

The transportation infrastructure in Maine continues to meet the needs of its businesses, but not without creating some inefficiencies, additional costs to shippers and receivers, and restricted modal selection. Maine's highway system is generally adequate, but like

many northeastern states, some smaller highways pass through small community centers, and have narrow segments and steep inclines. Routes 9 and 11 were cited by many private sector freight stakeholders as being good examples of road improvements, and suggestions were made to improve additional highways, such as adding lanes on Routes 1, 2, 4, 25, 26, 29, 302, and the Maine Turnpike, in a similar manner. In addition, though highway access to the ports of Portland and Searsport is good, landside access to the port of Eastport is limited.

Maine is served by eight freight railroads, although the State's core rail system consists of Guilford, BAR, and SL&A. Class I railroads have not operated in Maine for more than a decade. The regional railroads operating in Maine serve as gateways to the national networks of the remaining Class I railroads for long-haul movements. Maine shippers have direct access to CSX, NS, CP, and CN via Guilford and the SL&A. Some focus group participants indicated that high switchover costs often discourage use of the two Canadian railroads. Because there is no Class I service in Maine, Maine rail shippers must use multi-line rail service to reach distant markets. This type of service can be more expensive and less timely because of the cost and time associated with switching loads among different rail lines, in comparison to a single railroad.

Maine's airport system consists primarily of municipal airports and two larger regional airports in Bangor and Portland. Freight movements by air account for less than 1.0 percent of the State's total freight flows by weight, though these movements generally consist of high-value/low-weight commodities, such as semiconductors or perishable food items. The majority of the air freight in Maine is handled by the Portland Jetport, the Bangor International Airport, and the Auburn-Lewiston Municipal Airport.

The Maine DOT developed a three-port strategy for concentrating investment in deep water port access in 1978. This three-port strategy was originally developed as an investment plan designed to allocate scarce resources to the port facilities with the highest potential for growth. The three ports designated for growth under this strategy are the ports of Portland, Searsport, and Eastport. The port of Portland is the State's sole container handling facility and the only other container handling facility in New England other than Boston. The port of Searsport primarily handles bulk and break-bulk commodities through the Sprague Energy Terminal at Mack Point, while the Port of Eastport handles primarily value-added forest products for Domtar. Maine's three-port strategy is focused on supporting the development of infrastructure improvements, such as the construction of piers and breakwaters; access improvements, such as the dredging of channels and improving highway and rail access; and land improvements, such as the acquisition of land on which ports can expand.

While highway and rail access is generally good at the ports of Portland and Searsport, highway access at the port of Portland has been cited by some as inadequate. These inadequacies are currently being studied as part of the proposed connection of Interstate 295. Highway and rail access at the port of Eastport is limited; the closest railhead being located 17 miles inland. Though the port of Eastport enjoys the advantages of having a 64-foot natural channel and is the closest U.S. port to Europe, some believe its lack of intermodal access prevents it from efficiently serving inland customers.

Freight Flows

In 1998, there were about 102 million tons of freight moving into, out of, and within Maine; approximately 87 percent of this tonnage moved by truck. Freight movements between points within Maine (intrastate and intracounty movements) accounted for 69 percent of the overall tonnage. In 2006, approximately 126 million tons of freight are expected to be transported within Maine, an annual growth rate of approximately 3.0 percent. By 2006, the truck share is expected to decrease slightly to 86 percent, with that 1.0 percent of freight traffic shifting to rail.

Unlike other northeastern states, Maine exports more freight (14.1 million tons in 1998) to other states than it receives (10.3 million tons in 1998), though imports from Canada (4.7 million tons in 1998) outpace exports to Canada (2.7 million tons in 1998). The relative shares of these movements are also expected to remain the same in 2006.

The top commodity groups in 1998 consist of petroleum or coal products (42 percent); clay, concrete, glass, or stone (13 percent); lumber or wood products (excluding furniture) (11 percent); and pulp and paper products (11 percent) and account for 77 percent of the total flows, or 78.1 million tons. In 2006, the same four commodity groups are expected to account for 76 percent of the total flows, or 95.7 million tons. Again, these commodity groups consist of petroleum or coal products (41 percent); clay, concrete, glass, or stone (13 percent); lumber or wood products (excluding furniture) (11 percent); and pulp and paper products (11 percent).

Cumberland County is the top importing county in the State, receiving 12.9 million tons of freight in 1998. Cumberland County is expected to remain the top receiving county in 2006. Penobscot County is the top exporting county in Maine, exporting 9.6 million tons of freight in 1998. This County is expected to lead the State in exports again in 2006.

Institutional Issues

There are several institutional issues affecting freight transportation in Maine. These include specific issues, such as truck size and weight regulations, the rest area infrastructure, and the ability to identify back-haul loads for trucks. There are also larger, more generalized issues, including defining the appropriate role for Maine DOT in freight transportation planning, particularly in prioritizing and championing freight transportation investments.

Truck size and weight regulations. Many Maine-based shippers and carriers have expressed frustration with the disparity between Maine state truck weight limits and federal Interstate truck weight limits. Under existing federal regulations, trucks weighing more than 80,000 pounds are barred from traveling on the interstate highways other than the Maine Turnpike. Maine regulations, in contrast, allow trucks operating off the Interstates to weigh up to 100,000 pounds. This means that five- and six-axle trucks weighing more than 80,000 pounds, to remain legal, must divert to state and local roads that often pass through town centers, thereby contributing to pavement deterioration and raising safety concerns in the impacted communities. Another issue with some Maine shippers and carriers is the permit that Maine requires for the operation of trailers and semi-trailers between 48 and 53 feet long. These shippers and carriers feel that the permit creates an unnecessary administrative burden on motor carriers that is not imposed by other states.

The congestion delays and administrative costs arising from these issues have an impact on the resources shippers and carriers must expend to transport freight in Maine.

Rest area infrastructure. Maine has a primarily rural highway system with generally widely scattered rest areas for commercial vehicles. The lack of rest areas suitable for trucks is quickly becoming a national issue, as well. These and other concerns are in the process of being addressed through the Maine Commercial Vehicle Service Plan, designed to help the State identify ways to prevent driver fatigue through the construction, operation, and maintenance of commercial vehicle facilities.

Rail service. Many Maine-based shippers are concerned with the lack of adequate and consistent rail service within the State. Though Maine is served by six railroad companies, many Maine businesses do not have easy access to their services. This is the result of abandoned rail sidings and short lines, and lack of interest by the railroads in providing specific shippers with rail service. Further hindering efficient rail service in Maine is the fact that height and weight restrictions prevent the statewide operation of 286,000-pound rail cars and double-stack service in some areas. While some of Maine's regional and short line railroads may have the ability to safely handle 286,000-pound cars and double-stack service is provided along some corridors, there is no current strategy to address these and other rail infrastructure issues at a statewide level.

Back-haul loads. As Maine produces more goods than it consumes, there are a significant amount of "deadhead" miles being traveled on Maine's transportation network, increasing transportation costs for shippers, carriers, and consumers. Advancements in technology, however, are anticipated to provide new tools for use by Maine businesses in managing their transportation and distribution functions while making these functions

more efficient. Such advancements, including the use of the Internet to provide load-matching services and identify back hauls, may provide Maine businesses the opportunity to improve their efficiency and lower their overall freight transportation costs.

Maine DOT freight planning program. Maine DOT has included freight transportation interests into its general transportation planning process. The recent completion of the Heavy-Haul Truck Network Study is one example of how MDOT is attempting to further improve its freight planning capabilities. Unlike passenger transportation, which can often be thought of as a public service, freight transportation is strongly affected by market forces; a statement echoed by many private sector freight stakeholders. One of Maine DOT's challenges in developing a statewide freight program is balancing the concerns of the private sector, who often worry about regulatory issues and perceived modal biases, with the economic development, multimodal efficiency, and safety goals of the public sector.

■ 5.2 Recommendations

The original Maine IFP, completed in 1998, provided recommendations for the future direction of the OFT, highlighted problem areas along Maine's freight transportation network, identified potential freight improvement projects and a process for prioritizing investment in those projects, outlined opportunities for public-private partnerships, and developed a process for periodically updating the plan. Specific project recommendations were made in several areas:

- Training, education, and information efforts;
- Operations of the Maine DOT or other public agencies;
- Projects with a local emphasis;
- Statewide construction projects; and
- Institutional issues.

Several of the recommended projects in these areas have recently been implemented or are in the process of being implemented. For instance, a pre-clearance station for the border crossing in Calais was proposed in the 1998 IFP. Since that time, MDOT has provided project management for the Calais/St. Stephen Area Border Crossing Study, which is expected to result in the construction of a new border crossing. A new crossing would likely make use of such pre-clearance systems. Another recommendation from the original IFP was the construction of rest areas along interstate highways and secondary roads. MDOT has taken the first step toward implementing this recommendation through the undertaking of the Commercial Vehicle Service Plan Project, which will provide guidance to the State regarding the construction, operation, and maintenance of commercial vehicle facilities.

The recommendations proposed in this update to the IFP are designed to build upon and complement the recommendations provided in the original IFP. The recommendations in this report generally serve one of five functions that represent the core elements of freight planning identified for the state of Maine:

- Enhancing connections between the current modal networks to improve the functioning of the overall freight transportation system;
- Improving the efficiency of freight operations throughout the State through the use of new and improved technologies;
- Understanding the current and future freight transportation issues through the continued interaction among MDOT, private sector freight stakeholders, regional economic development interests, and the general public;
- Improving access to all modes of freight transportation, offering Maine businesses the opportunity to make shipment decisions based on individual commodity characteristics rather than being limited to a single mode; and
- Improving the quality and level of service of the existing freight transportation system, thereby increasing the array of transportation options available to regional freight shippers.

By addressing these core elements, the recommendations work together to create an environment where the freight transportation system can evolve, maximizing the role played by each mode, while ensuring a market driven, competitive environment. The recommendations in this report are grouped into one of three categories:

- **Infrastructure recommendations** are freight improvement projects that will expand or physically enhance the State's transportation infrastructure;
- **Policy strategies** seek to optimize governmental regulations or incentives to better manage freight traffic on the existing transportation network; and
- **Operational improvements/technology** use new paradigms in fleet management, low-capital network improvements, and emerging transportation technology to maximize the capacity and level of service provided by the State's transportation network.

Following these lists of recommendations, a list of proposed freight improvement projects identified by the focus groups and shipper carrier surveys is provided. These projects are also categorized into infrastructure improvements, policy strategies, and operational improvements/technology.

Infrastructure Recommendations

Short Term

- **Work with private sector stakeholders to identify “quick-fix” projects.** “Quick-fix” projects are normally small, easily implementable projects that can be accomplished quickly and with little funding. These projects, which can include signal timing or signage improvements or even pothole repairs, are an excellent way to immediately engage the private sector and begin to involve them in the transportation planning process. Maine DOT has a history of engaging the private sector in their freight planning processes and should continue to develop and build upon those private sector relationships through such a “quick-fix” initiative.

- **Continue to address the issue of adequate rest areas and other safety concerns.** Some private sector freight stakeholders indicated that there is a lack of rest areas suitable for trucks. These and other concerns are in the process of being addressed through the Maine Commercial Vehicle Service Plan, designed to help the State identify ways to prevent driver fatigue through the construction, operation, and maintenance of commercial vehicle facilities. The lack of rest areas is an issue not only for truck operations in Maine, but also nationally. MDOT should continue to take the lead in addressing these and other commercial vehicle safety concerns.

Long Term

- **Consider making improvements to key Maine highway corridors using the improvements to Route 9 as a guide.** During many of the outreach efforts conducted during this project, the private sector freight community expressed their pleasure with the widening and the addition of truck climbing and passing lanes to Route 9. These improvements provided significant benefits for both truck and passenger traffic traveling between the Canadian border and Bangor, crossing at Calais. To further improve truck operations within the State, MDOT should consider making similar improvements to U.S. Routes 1, 2, and 302, State Routes 4, 25, and 26, and other major truck routes identified in Maine's Heavy-Haul Truck Network Study. In addition, MDOT should use the Heavy-Haul Truck Network Study's planning model to identify other important freight transportation improvement projects.
- **Focus port development activities on enhancing modal connections.** Maine's three-port strategy has been successful in helping MDOT focus its port development efforts and make the best use of scarce port improvement funds to develop new facilities at Maine's three large ports over the last 20 years. However, landside access issues, particularly to the ports of Eastport (by rail) and Portland (by truck), is preventing Maine's ports from operating at their optimal efficiencies. MDOT should consider focusing future port development efforts on improving modal connections to and from the ports of Portland, Eastport, and Searsport and other ports, if necessary. Improving these connections, including the consideration of rail access to the port of Eastport via intermodal and/or trans-load facilities on the Calais Branch Railroad and truck access to the port of Portland via the proposed Interstate 295 extension, may result in more seamless intermodal connections and allow Maine's ports to operate more efficiently.
- **Focus attention and resources on the issue of security along Maine's freight transportation system.** Because of the recent terrorist attacks, MDOT will need to work with private operators to ensure that all facilities and infrastructure components are as safe as possible from future incidents.
- **MDOT should use the preferred alternative from the Aroostook County Transportation Study as a guide for future improvements to the Aroostook County highway network.** MDOT has been undertaking an extensive NEPA study to look at a number of alternatives to improve highway mobility and economic development in Aroostook County. The process started with 40 alternatives and is now down to four remaining build alternatives. The NEPA Environmental Impact Study will be released in early 2002 for public comment and review. Any preferred alternatives and projects

that are a result of this study will improve the flow of freight transportation to, from, and within Aroostook County.

Policy Strategies

Short Term

- **Continue to investigate highway projects and initiatives that improve the flow of freight into, out of, within, and through the State.** Since the publication of the original IFP, Maine DOT has undertaken a number of projects and studies aimed at improving access to interstate highways from rural routes and intermodal ports and terminals, alleviating congestion in small community centers, and using emerging technologies to improve commercial vehicle operations within the State. Such projects include the I-395 Extension Study, the Wiscasset Route 1 Corridor Study, and the Portland I-295 Connector Study. As freight movements in Maine are highly dependent on the truck mode, MDOT should continue to consider these and other highway projects and initiatives as part of their transportation planning program.
- **Continue freight education and outreach efforts.** The importance of freight transportation and the link between freight transportation investment and economic development is not always clear. Significant public outreach efforts were conducted during the course of this project; MDOT should continue to educate decision-makers and the general public on the importance of freight transportation and its role in maintaining Maine's economic vitality.
- **Develop an informational guide to MDOT freight planning activities.** Private sector freight stakeholders, public-sector decision-makers, and the general public are often not fully aware of the importance of freight transportation and the degree to which it is considered during the transportation planning process. To better explain its involvement in freight-related issues and to garner support for its freight planning program, MDOT should develop an informational guide to its freight planning activities. Such a guide, which should include information on MDOT's organizational structure, its transportation planning process, and the importance of freight transportation to the State's economic vitality, can be distributed to shippers, carriers, decision-makers, and the general public, at public meetings, FTAC meetings, and other outreach efforts. This brochure would also be a complement to OFT's other outreach efforts, including MDOT's informational video, *Move It!*, and the OFT web site.
- **Further develop relationships with private sector freight stakeholders.** Private sector participation is crucial to a successful statewide freight program, as private sector freight stakeholders can often provide the background and experience necessary to more fully address freight interests at the state level. MDOT should continue to engage private sector freight stakeholders through such groups as the FTAC in order to ensure their understanding of and participation in the statewide freight planning process.
- **Develop two-way communication protocol on the Maine OFT web site.** The Internet is a powerful tool for disseminating large amounts of information to large groups of people. It is also a useful tool for generating feedback and fostering dialogue within a community. While the Maine OFT web site is an excellent clearinghouse for informa-

tion on freight activities within the State, feedback is only provided informally via an e-mail link. Maine DOT should consider developing a more formal communications protocol on its web site through the development of an electronic dialogue feature. Electronic dialogues allow web site users to provide feedback, ask specific questions, and generate discussion among MDOT personnel and other web site users through the electronic posting of discussion threads. Such a feature would not only allow freight stakeholders to provide more focused and useful feedback on the OFT's freight activities, it would also allow OFT to expand their database of freight stakeholders through the voluntary collection of contact information from feedback providers. Such a feature would also allow OFT to generate notices via e-mail to keep freight stakeholders abreast of freight developments within Maine, helping to maintain the relationships developed with these stakeholders during the course of this project.

- **Coordinate transportation planning activities with the efforts of Department of Economic and Community Development.** There is a growing awareness of the importance of freight transportation and a push to link state transportation investment, especially freight transportation investment, to economic development. Access to adequate transportation is a critical factor in site location decisions along with other factors, such as utilities, work-force skills, and tax structure. Thus, it affects an area's business costs, markets, and overall competitiveness for attracting business investment. Therefore, transportation is a factor that influences the outcomes that local and regional economic development agencies are seeking to achieve – increasing their areas' business attractions, expansions, retentions, and startups. MDOT should consider developing a program to coordinate the efforts of the Department of Economic and Community Development (DECD) with its freight transportation planning activities to ensure that transportation improvements are considered during economic development activities, and vice versa. A joint pilot project by MDOT and the DECD should be conducted to demonstrate the effectiveness of such a partnership and encourage future efforts. One potential project to be considered is the development of a temperature-controlled warehouse for use by regional agriculture and fishing industries to consolidate shipments; a project proposed during one of the focus groups conducted during this IFP update. MDOT and the DECD could work together to determine the most suitable location for such a facility, one that met the needs of the agriculture and fishing communities while providing good access to major transportation networks.
- **Continue to fund the Industrial Rail Access Program (IRAP).** The IRAP is an excellent way not only to improve Maine's rail infrastructure, but also to encourage both public and private sector freight interests to consider ways in which the rail mode could be better utilized. MDOT should continue to identify specific rail needs and provide funding assistance (on a 50/50 match level) to ensure that rail infrastructure remains able to compete effectively with the highway mode. Improving transit times and service reliability was identified as important in the shipper surveys. This consistency and reliability of service depend on physical plant condition, both rights-of-way and terminals. The shipper surveys indicate that this function is still important and should continue. Particular emphasis should be placed on lines with large volumes of intrastate traffic as this is often the traffic that is most susceptible to truck diversion.

- **Continue to fund the Small Harbor Improvement Program (SHIP).** MDOT's Small Harbor Improvement Program (SHIP) is a competitive funding program in which MDOT uses general obligation bond funds, coupled with municipal funding matches, to construct marine infrastructure aimed at improving small commercial vessel operations. SHIP has been successful in funding nearly 50 separate waterfront and harbor improvement projects in 28 coastal cities and towns since 1995. Projects include wharf rehabilitation, shore stabilization, and the installation of fenders on town piers. These projects have improved public access to these waterfront facilities, complemented local economic development efforts, and improved the flow of certain commodities (e.g., fresh fish and lobster) to inland facilities. MDOT should continue to work with the Department of Economic and Community Development and the Department of Conservation's Boating Facilities Division to identify and fund worthwhile projects that improve marine freight operations in areas not included in the existing three-port strategy.
- **Use results of the Heavy-Haul Truck Route Network Study to identify potential freight transportation improvement projects.** MDOT is in the process of completing a Heavy-Haul Truck Route Study in order to develop planning criteria with which to identify and prioritize projects that improve the movement of trucks throughout the State. Working with the FTAC, MDOT should immediately use the results of the study to identify and prioritize freight transportation improvement projects for inclusion in the next update of the State Transportation Improvement Program (STIP). MDOT may also wish to use the results of that study, along with the Freight Transportation Advisory Committee, to designate a more operationally complete truck route network.
- **Continue the Access Management Program.** MDOT has developed an Access Management Program designed to conserve state highway investment, manage highway capacity, and maintain rural arterial speeds. Access management techniques can also help the flow of truck transportation by limiting the entry and exit points to and from main streams of traffic. Actively controlling the amount of traffic entering and exiting along major highway corridors can help products move in a more timely fashion between their origins and destinations while also improving safety, reducing congestion, and eliminating the need for future capacity expansion. MDOT should continue to implement this program and may wish to solicit feedback on the program's effectiveness through its freight community outreach efforts.
- **Develop a strategy to improve intermodal access to the port of Eastport.** Though the port of Eastport enjoys the advantages of having a 64-foot natural draft and is the closest U.S. port to Europe, its intermodal access issues prevents it from efficiently serving potential distant-inland customers. Eastport's closest railhead is located 17 miles inland and its highway access is limited. As a result, the port of Eastport finds it difficult to compete with other ports that can provide better service to inland areas. MDOT should assemble a focus group of shippers, carriers, railroads, members of the Eastport Port Authority, and other local stakeholders to develop a strategy to address this problem.
- **Encourage Maine Metropolitan Planning Organizations (MPO) to include private sector freight representatives on their planning committees.** The private sector freight community can provide the background, training, and expertise necessary to

fully address freight in both statewide and metropolitan planning processes. While MDOT has developed solid relationships with private sector freight stakeholders at the state level, there is often limited participation by the private sector in the transportation planning process at the metropolitan level. As metropolitan transportation improvement programs (TIP) eventually form the core of the statewide transportation improvement program (STIP), it is important that the private sector freight community be involved during the metropolitan planning process, as well. To ensure that private sector freight stakeholders can provide input throughout the transportation planning process, MDOT should encourage Maine's MPOs to include private sector representation on their planning committees.

- **Continue purchasing commodity flow data every year.** In order to maintain an effective statewide freight planning program, it is important to monitor growth in commodity movements. Though a 2006 commodity flow forecast was analyzed during the course of this IFP update, freight movements are highly sensitive to changes in statewide, regional, national, and international economies and other market forces. Though it is not necessary to purchase detailed commodity flow data (such as the type purchased for use in this IFP update) each year, MDOT should continue purchasing data showing total freight movements into, out of, and within Maine on an annual basis.

Long Term

- **Continue freight data collection efforts.** A significant amount of freight data were collected during the course of this project. These data not only included commodity flow information, but also data regarding the issues and concerns of the private sector freight community. Such information was invaluable in developing a freight profile for the State and will help Maine DOT focus its freight transportation planning activities. Freight transportation patterns are dynamic, often changing as a result of market forces or other ambiguous factors. In order to stay abreast of the constantly changing freight environment in Maine, MDOT should continue to collect freight data, possibly by developing a small (one-page) survey for shippers and carriers with which to determine freight trends. These efforts could be supplemented periodically (no more than every three years) by a more extensive data collection effort, including the purchase of commodity flow and origin-destination data to more precisely determine freight patterns into, out of, and within the State.
- **Encourage Congress to address Interstate truck weight limits.** A recurring issue in the public outreach meetings and interviews conducted during the course of this project was the disparity between Interstate and non-Interstate roadway weight limits. Truckers expressed frustration with the federal 80,000-pound gross vehicle weight (GVW) limit enforced along interstate highways. Many Maine-based trucking companies believe that these weight restrictions prevent them from fully realizing their full operational efficiencies. This is of such concern to the private sector freight stakeholders that MDOT needs to work with the Maine congressional delegation to more fully address this issue.

- **Study trailer size limits.** A related issue with some Maine shippers and carriers is the permit that Maine requires for the operation of trailers and semi-trailers between 48 and 53 feet long. Because Maine's trailer size regulations are more restrictive than those of other states, some shippers and carriers feel that the permit creates an unnecessary administrative burden on motor carriers operating in Maine. MDOT should conduct a study to determine the costs and benefits of allowing 53-foot trailers to operate within the State without a special permit.
- **Readdress existing three-port strategy.** Since 1978, Maine DOT has operated under a three-port strategy for concentrating investment in deep water port access. The three ports designated for growth under this strategy were the ports of Portland, Searsport, and Eastport. While this three-port strategy has been successful in focusing scarce port development resources at these three major facilities, it prevents MDOT from providing funds to other ports, which often must compete for funding from other sources, such as the Small Harbor Improvement Program. Dragon Cement, for instance, currently ships cement by barge from Rockland to Boston. Similarly, there has been interest in providing marine cargo service from the Mason Station in Wiscasset. While improvements to these facilities in Rockland and Wiscasset may improve freight movements throughout the State and attract further business development, these and other areas are not eligible for state-funded improvements

under the existing three-port strategy. To improve the operations of the State's overall marine system, MDOT should consider re-addressing or supplementing its three-port strategy to include other marine ports in addition to Portland, Searsport, and Eastport.

- **Develop a strategy to address freight rail height and weight restrictions.** Many Class I railroads are beginning to operate 286,000-pound rail cars on their lines. The use of these heavier cars, coupled with the industry's increasing reliance on double-stack operations, is designed to improve the operating efficiency and level of service of rail transportation. Though there are no Class I railroads operating in Maine, several of the State's regional carriers interline with these larger railroads. While some of Maine's regional railroads may have the ability to safely handle 286,000-pound cars and double-stack service is provided along some corridors, height and weight restrictions prevent the operation of these trains statewide. MDOT should work with the railroads operating in Maine to develop a strategy to address existing statewide rail height and weight restrictions. This strategy would include the identification of key rail corridors, the identification of key markets that may benefit from improved rail infrastructure, and the development of alternative approaches to addressing these and other rail infrastructure issues at the state level.
- **Develop a strategy for future MDOT investment in railroad infrastructure.** Because Maine is not served by a Class I railroad and regional and short line rail service is not available at all points within the State, rail transportation is not a realistic option for some Maine-based shippers. To address this problem, MDOT should work with Maine-based shippers and the railroad companies serving the State to develop a strategy for future state investment in rail infrastructure. Such a strategy could include purchasing abandoned rail lines that serve critical industries or providing one-time operational funding to maintain or improve service. MDOT's rail infrastructure investment strategy should be designed to improve rail competition and shipment reliability to the point where rail can become a viable transportation mode for more Maine-based shippers.
- **Consider trade corridors during freight planning efforts.** The identification of regional trade corridors is a good way to focus investments in the most heavily utilized segments of the transportation system. While specific origins and destinations of Maine freight were not identified during this IFP update, interstate movements currently account for 24 percent of the overall tonnage shipped within the State while movements to and from Canada account for 7.0 percent of total tonnage. This may indicate that a significant portion (31 percent) of Maine freight shipments occur on regional trade corridors. As an active member of both the Eastern Border Transportation Coalition (EBTC) and the I-95 Corridor Coalition, MDOT recognizes the regional importance of freight movements. MDOT should continue its active involvement in regional freight studies conducted by these coalitions and may wish to consider conducting its own analysis to identify its major trading partners. Such an analysis would require the collection of detailed origin-destination data, either through intercept surveys along major trade routes or the purchase of Reebie TRANSEARCH origin-destination data for freight movements into, out of, and within the State.

Operational/Technology Improvements

Short Term

- **Investigate the use of Internet-based technologies to improve freight transportation efficiency and lower overall freight transportation costs.** The Internet has changed the way information is managed, particularly in the trucking industry, where it facilitates the flow of information between shippers, carriers, freight forwarders, and even governmental regulatory agencies. There are several areas in which the increased use of the Internet may improve the efficiency of freight movements within Maine, resulting in lower overall transportation costs for Maine businesses.
 - The first of these areas is empty back hauls. As Maine exports more goods than it imports, there are a significant amount of “empty miles” being traveled on Maine’s transportation network, increasing transportation costs for shippers, carriers, and consumers. The Internet is a useful tool in identifying back-haul loads, thus preventing “deadhead” mileage and improving operational efficiency. Another such issue is on-line permitting.
 - The Internet has proven to be an effective medium through which to issue and track permits for oversize and overweight vehicles. Issuing and tracking such permits electronically expedites the application and approval process and can minimize delays to oversize or overweight shipments.
 - MDOT has begun to define the role of the Internet in its freight transportation planning activities, even raising the possibility of providing load-match information on its own web site. Though this suggestion was met with mixed reviews during the outreach efforts conducted over the course of this project, MDOT should continue to incorporate the use of Internet technologies into its freight program where deemed appropriate by MDOT and the Maine shipping community.
- **Expedite improvements to the Kittery-York Weigh Stations.** MDOT plans to install in-ground truck weigh scales at both the northbound and southbound I-95 commercial vehicle enforcement areas in Kittery and York. As part of this project, the Department also will install an additional storage lane at each site for trucks waiting to pass enforcement checks. These improvements will speed up vehicle weighings, reduce the need for station closings because of truck backups, and pave the way for further automation projects at the two facilities. MDOT will be exploring various carrier pre-clearance programs that would allow vehicles with clean records to legally bypass enforcement details at the Kittery-York weigh stations.

Long Term

- **Continue to employ ITS technologies to improve commercial vehicle operations.** MDOT has been utilizing ITS technologies to streamline commercial vehicle operations within the State. Current projects include the Unified Motor Carrier Account Management System (UMCAMS), the Commercial Vehicle

Information Systems Network (CVISN), and the Performance Registration and Information Systems Management (PRISM) program. Through its ITS/CVO Working Group, MDOT should continue to monitor advances in transportation technology and investigate ways to adapt that technology to benefit freight movements into, out of, and within the State. Potential ITS applications that may benefit freight movements within Maine include:

- The use of weigh-in-motion (WIM) technology to automate traditional commercial vehicle weigh stations. The use of WIM could eliminate the need for legally loaded trucks to stop at these weigh stations, improving the flow of freight throughout the State;
- The use of laptops by CVO inspection personnel to facilitate processing of inspection reports and improve the ability to pre-screen truckers using national databases;
- The development of an automated oversize/overweight routing and permitting program to streamline the current process for routing and permitting large trucks within the State; and
- The integration of existing traveler information systems that provide traffic flow information, with information systems in use at ports and intermodal facilities that can provide information on vessel arrival and container availability. The integration of these two types of systems, such as the Port Authority of New York and New Jersey's Freight Information Real-Time System for Transport (FIRST), can improve traffic flow near ports and intermodal terminals.

Appendix A

- Project Approach

This project updates the first Integrated Freight Plan (IFP) completed in 1998. The overall project approach was to build upon the existing IFP, to update data where appropriate, and to take the next step forward in statewide freight transportation planning. An effort was made not to duplicate work completed in the earlier IFP. The updated project included completion of five separate tasks: data collection, data analysis, public participation, development of recommendations, and preparation of the IFP. Figure A.1 illustrates the major activities completed under each task. This section describes in more detail the task activities completed.

■ A.1 Data Collection

Data collection was a key component of this effort because, through this activity, MDOT could begin to measure and evaluate which characteristics of the freight system that had changed since completion of the initial IFP. This was the first opportunity for OFT to review its first freight transportation planning effort and determine what worked well, what needed to be changed, and where the program ought to be headed. It has been a priority for MDOT to connect with the freight system users and work with them to improve and expand available freight services. Therefore, a primary data collection activity focused around collecting information from shippers, receivers, and carriers. A second focus of the data collection was to acquire more geographically disaggregated commodity flow data, which, in years past, was only purchased at the state level.

The specific data collection activities were as follows:

- **Identify and gather existing data and reports describing the State's freight transportation system.** With the assistance of the OFT, data sources were identified. This included the results of a web-based literature search completed by OFT.
- **Develop mail-out surveys and personal interview forms.** Mail-out survey forms were developed for shippers/receivers and municipalities. These data collection tools are provided in Appendix B. These instruments were coordinated with the previous IFP forms to allow for some trend analysis. The interview forms contained the same set of questions for shippers/receivers. A separate list of questions was developed for carrier-provided interviews. No mail-out survey was undertaken for motor carriers, as MDOT had recently conducted a survey as part of the Heavy-Haul Truck Route Study.

Figure A.1 Technical Approach

Task 1 Data Collection	Task 2 Data Analysis	Task 3 Public Participation	Task 4 Recommendations	Task 5 Prepare Final Report
<ol style="list-style-type: none"> 1. Identify and collect existing data and reports 2. Review and update 1998 survey instruments 3. Administer surveys/interviews 4. Collect existing freight flow data 	<ol style="list-style-type: none"> 1. Analyze new survey/interview data 2. Compare new survey data to 1998 data 3. Develop freight flow trends 4. Develop economic trends 5. Develop forecasts for Maine's top industries over the next 20 years 6. Identify and analyze the impact and opportunities of advancements in technology 7. Identify key freight issues (technology, logistics trends, small package industry, border crossing, etc.) 	<ol style="list-style-type: none"> 1. Outreach activities conducted in coordination with the survey/interview processes 2. Organize and run up to three focus groups for Maine's freight stakeholders 3. Ensure regular communication between OFT staff and CS team project staff 	<ol style="list-style-type: none"> 1. Summarize data and analyses 2. Identify key freight trends 3. Identify key opportunities 4. Develop recommendations for short-term and long-term freight projects 	<ol style="list-style-type: none"> 1. Prepare initial draft final report 2. Prepare draft final report 3. Prepare final report 4. Present final report

- **Distribute mail-out surveys and conduct personal interviews.** The mail surveys were distributed to 600 Maine businesses and 42 municipalities. Personal field interviews were conducted by OFT staff with 52 businesses. All data were entered into an MS Access database. The companies were identified through a manufacturer's database purchased by MDOT from Tower Publishing in March 2000. This database contained over 1,200 records of companies based in Maine. The selection process was based on three factors: 1) number of employees; 2) geographic coverage; and 3) type of operation. It was important to include large companies because they move large quantities of freight. However, it was also necessary to include small companies, as they represent the majority of businesses in Maine. Wide geographic coverage was critical, because this is a statewide freight plan and access to all areas is relevant. A mix of operations also was important to reflect the varied transportation services required in Maine. Of the 600 shipper/receiver recipients, about 300 consisted of companies with more than 50 employees. This captured all Maine companies in the database with 50 or more employees. The remaining 300 recipients with less than 50 employees were selected randomly based on a mix of operations, ensuring that recipients were selected from all counties in Maine.
- **Purchase county-level commodity flow data from Reebie Associates.** Two TRANSEARCH databases were purchased from Reebie Associates for the state of Maine. They consisted of a 1998 base year, and a 2006 forecast year. The base-year commodity flow data are derived from existing proprietary, commercial, and publicly available data sources and supplemented with economic forecasting techniques. The commodity flow forecasts are based on economic projections from various industries. Each database distinguished between intrastate moves (both an origin and destination in Maine) and interstate trips (either origin or destination outside of Maine).
- **Complete Internet-based search for load-matching services (to assist with the back-haul issues in Maine).** As Maine produces more goods than it consumes, Maine carriers often have trouble identifying back-haul loads for delivery to Maine on their return trips. The Internet presents an opportunity for Maine-based shippers to more easily identify such back-haul loads. A search of available Internet-based logistics services was completed. This search detailed load-matching services, comparing type of service and cost.

■ A.2 Data Analysis

Data collected in the data collection step were analyzed in order to develop a comprehensive description of the freight transportation system in Maine. This included looking at operational characteristics, defining commodity flow movements, and identifying institutional issues. Specific activities of this task included analysis of:

- **Web-based literature search conducted by OFT.** The summary of available web-based freight resources developed by OFT was reviewed.
- **Mail-out survey and personal interview databases.** The shipper/receiver surveys, municipality surveys, and shipper/receiver and carrier interviews were analyzed to identify key operational and infrastructure issues, as well as identify trends and/or changes in perceptions since the first surveys completed in 1997. Of the 600 surveys sent out, 169 were returned. This 28 percent rate of return is considered excellent for this type of data collection activity. All parts of the State are represented in these surveys. Surveys were prepared and distributed to 42 municipalities in Maine, as identified by MDOT as areas along known freight corridors. Of these, 17 were returned. In addition, as with the 1998 IFP, 52 personal interviews were conducted by MDOT staff with shippers/receivers and carriers. MDOT interviewers were used to communicate MDOT's commitment to freight transportation planning, and to build relationships for future initiatives.
- **TRANSEARCH commodity flow databases.** The 1998 and 2006 databases were analyzed to develop a comprehensive commodity flow profile for Maine, describing type of movement, mode splits, top commodities, and value versus weight for commodities moving within the state of Maine. The commodity flow analysis is based on the TRANSEARCH commodity flow data purchased for the Maine DOT from Reebie Associates of Stamford, Connecticut. This is the best and only data available of this type. This data set provides freight flows by weight moving into, out of, and within Maine for 1998 and 2006. The most current data set available from Reebie Associates at the time this study commenced was 1998. The next update of the TRANSEARCH data will be for year 2000, and it is anticipated to be available in the fall of 2001.

Commodity flow data are valuable tools for freight transportation planning activities, as they can provide information on freight movement types, mode split, and key commodities, as described above. However, it should be noted that there are some limitations to how this data should be used and interpreted. Many practitioners ask questions relating to volume, intermodal trip reporting, specific corridors, and point-to-point shipments. In responding to these questions, commodity flow analysts are left to explain the idiosyncrasies of the data. Unfortunately, often times the only answers available to many of these questions are statements such as "the data are only as good as their source," or "it depends on how industry representatives responded to the surveys," or "some information was withheld for reasons of confidentiality."

In some cases, data are not available for certain types of flows. The Rail Waybill data used by Reebie Associates, for example, is based on data collected by Class I railroads. The waybill data contains some information for regional and short-line railroads, but only in regards to interline service associated with a Class I railroad. This is important to Maine, as it does not have any direct service from a Class I railroad. The rail tonnage movements provided by the TRANSEARCH database, therefore, are conservative estimates.

The following are other examples of the limitations of the data utilized in this project:

- **Use of Multiple Data Sources** – The commodity flow data developed by Reebie Associates consist of a national database built from company-specific data and other available databases. To customize the dataset for a given region and project, local and regional data sources are often incorporated. This incorporation requires the development of assumptions that sometimes compromise the accuracy of the resulting database. Different data sources use different classifications; most economic forecasts are based on SIC codes while commodity data are organized by STCC codes. For example, the U.S. Bureau of Census' Vehicle Inventory and Use Survey has its own product codes that must be assigned to STCCs to convert truck commodity flows to truck trips. These and other conversions can sometimes lead to some data being miscategorized or left unreported.
- **Data Collection and Reporting** – In many databases, particularly those that are based on industry surveys, the accuracy of the data decreases as the geographic regions become smaller, e.g., commodity flows between states are normally more accurate than commodity flows between counties. One reason for this decrease in accuracy is that public entities are often prohibited from publishing data that would disclose the operations of individual firms or establishments. The Bureau of Transportation Statistics' Commodity Flow Survey, for example, aggregates its data for specific regions in such a way as to protect the confidentiality of the industry participants. This is also a common practice for publicly available socioeconomic data, such as employment statistics. Another factor that affects the accuracy of commodity flow data is the way in which data are reported. The level of detail provided from some specific companies when reporting their freight shipment activities limits the accuracy of the final commodity flow dataset generated by Reebie Associates. If a shipper moves a shipment intermodally, for example, one mode must be identified as the primary method of movement. Suppose three companies make shipments from the Midwest U.S. to Europe using rail to New York then water to Europe. One company may report the shipment as simply a rail move from the Midwest to New York; another may report it as a water move from New York to Europe; the third may report the shipment as an intermodal move from the Midwest to Europe with rail as the primary mode. The various ways in which companies report their freight shipments proves that the adage "data is only as good as its source" is particularly applicable to commodity flow data.
- **Limitations of International Movements** – Reebie does not report international air shipments through the regional gateways. Additionally, specific origin and destination information is not available for overseas waterborne traffic through marine ports. Overseas ports are not identified and Reebie estimates the domestic distribution of maritime imports and exports. Reebie's TRANSEARCH data also does not completely report international petroleum and oil imports through marine ports. This is a concern to a state like Maine, which receives large amounts of petroleum through its major marine ports from Canada. Finally, Reebie assigns commodity data only to the truck, rail, air, and water modes, though a large percentage of foreign

imports (by weight) consist of oil and petroleum products – commodities that are frequently shipped via pipeline to storage and distribution points.

- **Best available data.** It should be noted that although the commodity flow data used in this study are at times limited, the analysis presented in this section would not be possible without this type of information. The commodity flow data provided by the TRANSEARCH database are the best currently available and though there may be specific questions left unanswered, the commodity movements into, out of, and within Maine are now much more thoroughly understood.

The following describes the data analysis components applied to the TRANSEARCH databases:

- **Commodity.** The database provides flows for specific commodity groups based on Standard Transportation Commodity Classifications (STCC). Maine purchased commodity flow data at the four-digit STCC level in order to focus on key Maine commodities, such as petroleum refining products (STCC 2911).
- **Mode.** The database provides flow by mode. Data are provided for truck, rail, air, and water movements. This modal disaggregation was used to analyze the proportion of freight carried by each mode in Maine. The truck and rail modes were further disaggregated for the U.S. flows. Truck flows were broken down into truckload, less-than-truckload (LTL), and private fleets, while rail flows were divided between carload and intermodal moves. These disaggregations were provided only for flows within the United States; they were not provided for flows into and out of Canada.
- **Movement Type and Direction.** Commodity flows between specific origin-destination pairs were not provided; rather, flows were defined by movement type and direction. Four movement types were defined within the TRANSEARCH database:
 - ◆ *Interstate:* These movements identified commodities moving between Maine and other states;
 - ◆ *Intrastate:* Also called intercounty, these movements identified commodities moving between individual counties within Maine;
 - ◆ *Intracounty:* These movements identified commodities moving within Maine counties;
 - ◆ *Canada:* These movements identified commodities moving between Maine and Canada; and
 - ◆ For each movement type with the exception of intracounty, flows were identified as inbound (to Maine) or outbound (from Maine).

- **Future-Year Forecast.** The base-year 1998 TRANSEARCH data was forecast by Reebie Associates to predict 2006 flows into, out of, and within Maine. 2006 was selected by MDOT as the forecast year to correspond with its existing planning activities. The forecast developed by Reebie Associates was based on an economics model built and maintained by WEFA, Inc. Working with this model, Reebie Associates was able to extract forecasts by commodity classification based on production and consumption factors. These factors were then applied to the base-year (1998) commodity flow data to calculate a forecast for 2006. The production factors drove the forecasts of outbound flows, and the consumption factors drove the forecasts of inbound flows.
- **Economic and demographic data.** Available data were analyzed to develop an economic profile of Maine. This included population, employment, and industry-specific trends and forecasts.
- **Freight infrastructure logistics patterns for Maine shippers.** Survey and interview data were used to identify examples of supply chain management strategies.
- **Web-based load matching services data.** An inventory of web-based services was developed and reviewed for applicability to Maine shippers and carriers.
- **Key freight issues.** All data were reviewed and used to develop a detailed list of key freight issues.

■ A.3 Public Participation

Public participation ensured that key freight stakeholders had an opportunity to provide input to the MIFP update. This is critical for successful freight transportation planning, as the system users know what works and what does not. The extensive survey and interview effort involved in the plan update provided many opportunities for individual input. The remainder of the program consisted of making presentations to the Freight Transportation Advisory Committee (FTAC) and holding meetings with three stakeholder focus groups. Specific activities undertaken as part of this task included the following:

- **A coordinated effort was made to describe the freight plan goals in the mail-out surveys and the personal interview process.** Part of the data collection effort focused on educating the stakeholders surveyed and interviewed about the goals and objectives of the freight plan update, as well as the existing and ongoing activities of the OFT.
- **Three focus groups were held with shippers/receivers, carriers, and government/lobbyists.** The Maine Department of Transportation hosted freight stakeholder focus groups on May 30 and 31, 2001. Three distinct groups were invited: 1) shippers and receivers; 2) carriers and providers; and 3) government, interest groups, and trade organizations. The sessions were held at the King Street Mediation

and Facilitation Resources Center in Augusta. Each of the three focus groups was held for an approximately three-hour session using the same meeting format. The first half-hour provided time for refreshments and networking. Robert Elder, Director of MDOT Office of Freight Transportation, welcomed the group and thanked everyone for their time. He explained that this would be the first time his office has incorporated this much outreach effort into an integrated freight plan.

Attendees of the morning sessions were divided into smaller breakout groups to brainstorm about Maine's freight transportation system, providing real life experiences and examples of the strengths and weaknesses of the existing freight system. The afternoon session was combined into one discussion group due to the limited number of participants. Each group was given the opportunity to identify improvement projects and debate their priorities. MDOT staff was excluded from this exercise to promote an open atmosphere of discussion. The groups were reunited for discussion and presentation of their material. MDOT staff returned for this session to hear summaries of the group discussions. Tape recorders were intentionally not used in order to maintain anonymity and to keep participants from feeling inhibited in their comments. The following summaries incorporate comments and suggestions from the focus groups.

- **Coordination with FTAC.** The FTAC was involved in the review of the project scope and provided expertise of freight transportation in Maine over the course of the study. The members represent 23 private sector representatives from the Maine freight community. It is an ongoing committee that meets periodically with MDOT to discuss issues and projects, such as this update.
- **The final outreach activity will be the presentation and distribution of the updated MIFP.** The MIFP will be prepared, presented, and distributed to Maine's freight stakeholders. The plan also will be made available through MDOT's Office of Freight Transportation web page (<http://www.state.me.us/mdot/freight/homepage.htm>), and a presentation will be made to the FTAC.

■ A.4 Develop Recommendations

The final technical component of the IFP update process was to develop findings and conclusions from the above analyses and make recommendations to address the identified freight bottlenecks. Short- and long-term projects and policies were identified to improve the freight transportation system in Maine, and a set of next steps were developed to guide OFT's future freight planning program. The recommendations proposed in this update to the IFP are designed to build upon and complement the recommendations provided in the original IFP. The recommendations in this report generally serve one of five functions that represent the core elements of freight planning identified for the state of Maine:

- Enhancing connections between the current modal networks to improve the functioning of the overall freight transportation system;
- Improving the efficiency of freight operations throughout the State through the use of new and improved technologies;
- Understanding the current and future freight transportation issues through the continued interaction among MDOT, private sector freight stakeholders, regional economic development interests, and the general public;
- Improving access to all modes of freight transportation, offering Maine businesses the opportunity to make shipment decisions based on individual commodity characteristics rather than being limited to a single mode; and
- Improving the quality and level of service of the existing freight transportation system, thereby increasing the array of transportation options available to regional freight shippers.

The recommendations in this report are grouped into one of three categories:

- Infrastructure recommendations are freight improvement projects that will expand or physically enhance the State's transportation infrastructure;
- Policy strategies seek to optimize governmental regulations or incentives to better manage freight traffic on the existing transportation network; and
- Operational improvements/technology use new paradigms in fleet management, low-capital network improvements, and emerging transportation technology to maximize the capacity and level of service provided by the State's transportation network.

■ A.5 Prepare the Updated Maine Integrated Freight Plan

The objective of this task was to document the findings of the MIFP update process and to produce an updated IFP. The effect of freight flows and projected economic growth on transportation infrastructure and service options was considered preparation of an initial draft IFP. The plan documents the work steps necessary to complete the plan and provides a set of recommendations for the OFT and the local freight stakeholders. Specific activities included are as follows:

- In consultation with the OFT, an outline for the updated IFP was developed.
- The initial draft final plan was prepared documenting the findings of the study.
- Comments received from OFT staff were incorporated into the initial draft final plan to prepare the draft final plan.

- The draft final plan was distributed to key stakeholders, including members of the FTAC, for comment. These comments were incorporated based on consultation with OFT staff to prepare the final plan and Executive Summary.
- The final updated IFP and Executive Summary were delivered to MDOT and made available to the public through the MDOT's Office of Freight Transportation web page (<http://www.state.me.us/mdot/freight/homepage.htm>).

Maine Integrated Freight Plan
Carrier Interview Guide

Company Name: _____ Contact: _____

Title/Position: _____ Phone/Fax: _____

Address: _____ Email: _____

1. Describe the primary function of your operation. What are your day-to-day responsibilities?
2. Describe your facility.
 - Transportation equipment
 - Sorting or storage facilities
 - Receiving/shipping facilities
 - Modal access (highways, railroads, waterways, etc.)
 - Annual tons moving through your operation
 - Define the average size shipment handled
 - Categorize the type of freight you move (by weight, by value, by commodity)
 - Describe the primary markets served (where is the freight originating and terminating)
3. Are your customers mode dependent? Yes or No. If yes, how?
4. Do you have balanced freight flows (backhaul)? Yes or No. Explain implications whether yes or no. What is your typical deadhead trip length to pickup your next load?

5. Is your operation dependent on any other mode of transportation? If so, which one(s) and why?
6. How would you characterize the transportation services you provide (e.g., expensive, time definite, reliable)?
7. How do you communicate with your customers? Do you provide en-route shipment status? Yes or No. If yes, how?
8. Describe the typical flow of freight through your operation (e.g., from the time it enters through the gate until it departs). Include any uses of technology.
9. Who are your major customers?
10. Who are your major competitors?
11. Do you have any expansion plans? Yes or No. If yes, what are they?
12. What are the strengths of Maine's freight transportation system?
13. What are the weaknesses of Maine's freight transportation system?
14. How could the existing transportation system be operated differently to improve your operations?
15. How could the existing transportation system physically be changed to improve your operations?

Economic and Demographic Data

Maine's economy grew steadily during the 1990s. Its unemployment rate fell throughout most of the decade, mirroring a national trend, but remained higher than the rate for New England as a whole. Job growth was robust, but failed to measure up to the U.S. average. By the end of the decade, Maine's average annual wage remained lowest among the New England states and below the national average.

■ C.1 Unemployment

One of the most frequently used economic indicators is the unemployment rate. As calculated by the U.S. Bureau of Labor Statistics (BLS), the unemployment rate measures the number of job seekers in the labor force who are unable to find work.⁵ Figures C.1 and C.2 compare unemployment rates in the United States, New England, and the six New England states from 1990 to 1999. For much of the decade, Maine's unemployment rate remained close to the national average, but higher than the New England average. It fell steadily beginning in 1993, and by 1999 had reached a low of 4.1 percent, compared to 4.2 percent nationwide. Low unemployment generally indicates a healthy economy, but with the potential for labor shortages, especially for skilled positions. However, there are concerns in many New England states, including Maine, that low unemployment may be as much a reflection of slow population growth as an expanding economy.

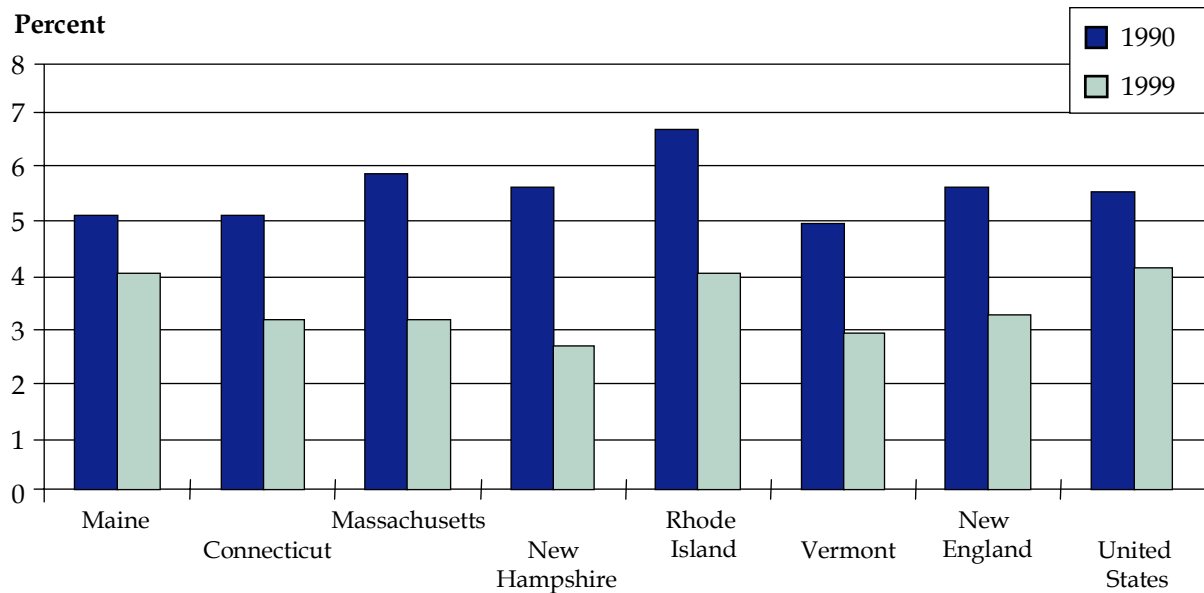
■ C.2 Employment

Another important measure of a region's economic vitality is employment growth. Figure C.3 displays total employment growth for the U.S., New England, and each of the six New England states from 1990 to 1999. At just under 10 percent, Maine's employment growth was a little more than half the U.S. average, but somewhat higher than the New England average. Employment growth in Maine was led by retail trade, finance, business services, health services, and social services.

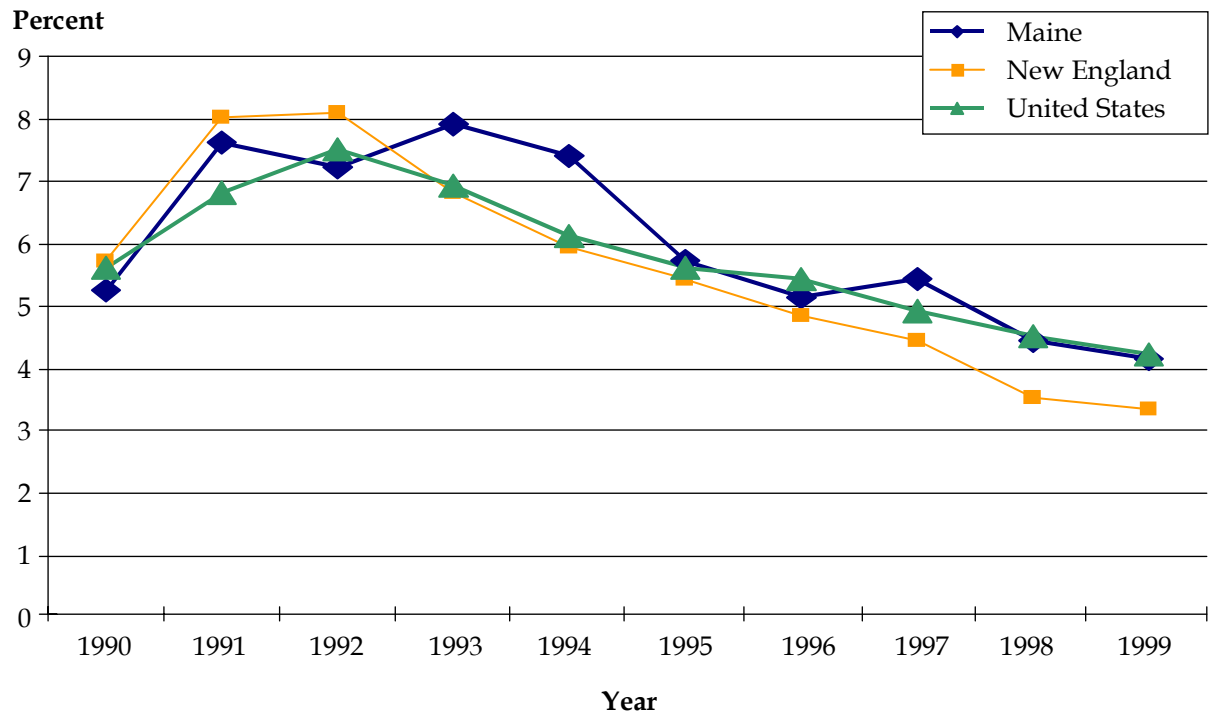
⁵ The labor force is composed of two primary groups above the age of 15: employed and unemployed. The unemployed category includes a variety of individuals seeking work but does not include those making no efforts to find a job. These individuals are not considered part of the labor force.

Between 2000 and 2020, Maine's service sector is expected to grow from 34 percent to 39 percent of total employment. Sectoral distribution of Maine's employment is shown in Figure C.4.

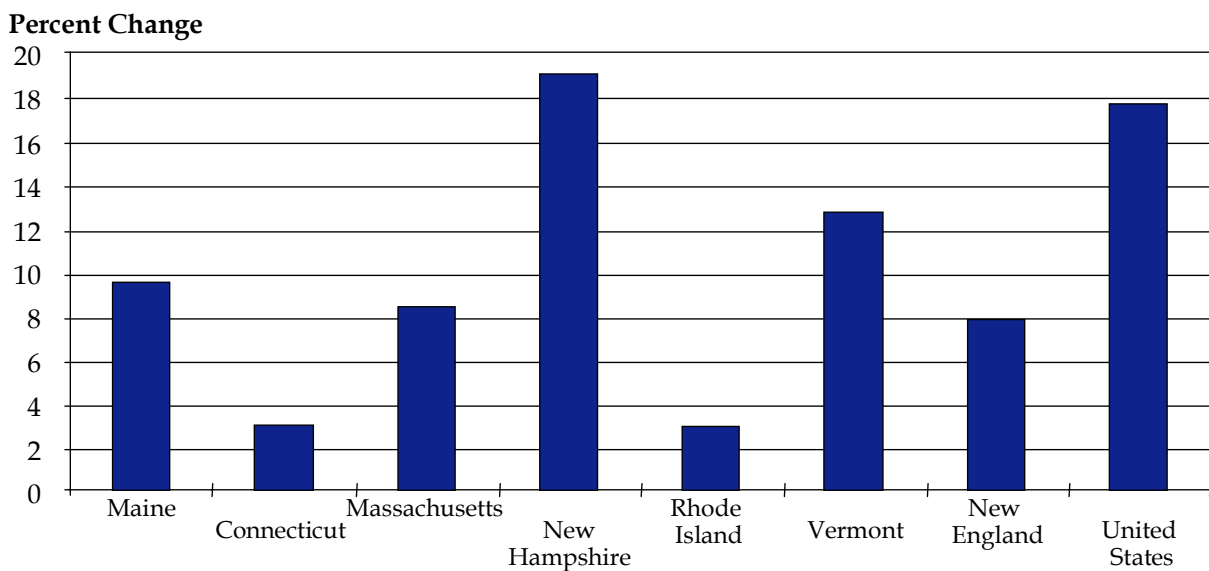
Figure C.1 Unemployment Rates, 1990 and 1999



Source: U.S. Bureau of Labor Statistics.

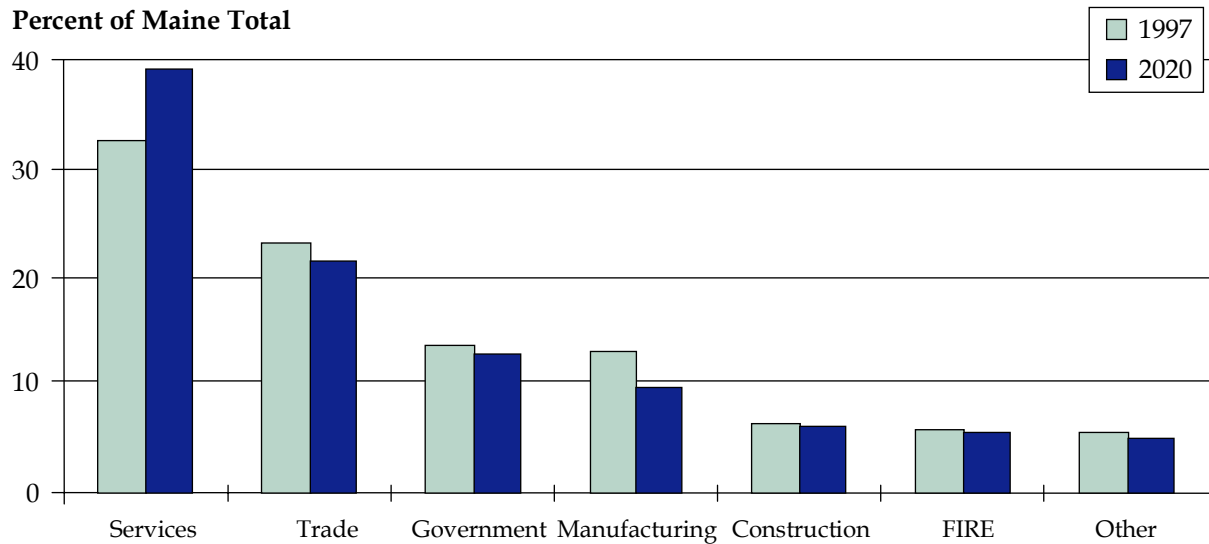
Figure C.2 Unemployment Rates, 1990-1999

Source: U.S. Bureau of Labor Statistics.

Figure C.3 Employment Rates, 1990-1999

Source: U.S. Bureau of Labor Statistics.

Figure C.4 Distribution of Maine Employment by Industry
1997-2020



Note: Trade = Wholesale and Retail Trade; FIRE = Finance, Insurance, and Real Estate

Source: U.S. Bureau of Labor Statistics.

■ C.3 Population Growth

Population change is a third important economic indicator, as increases in population create added demands for goods and services. Figure C.5, shows population growth from 1990 to 2000 for the U.S., New England, and each of the six New England states. Over the course of the decade, Maine's population grew by four percent, only about one percent slower than the New England average. However, compared to the U.S. population as a whole, which grew by 13 percent over the same period, Maine grew at a much slower pace. By 2000, Maine's population ranking among the 50 states had fallen from 38th to 40th.

In the future, this trend is expected to continue. During the first quarter of the 21st century, Maine's population is expected to grow by about 13 percent, while the U.S. population as a whole is expected to grow by 23 percent. These changes are shown in Figures C.6 and C.7. This below average growth in population will potentially result in a continuation of the existing back-haul issue, which is based on a greater outbound flow of raw and finished goods than the inbound flow of goods for consumption by the population.

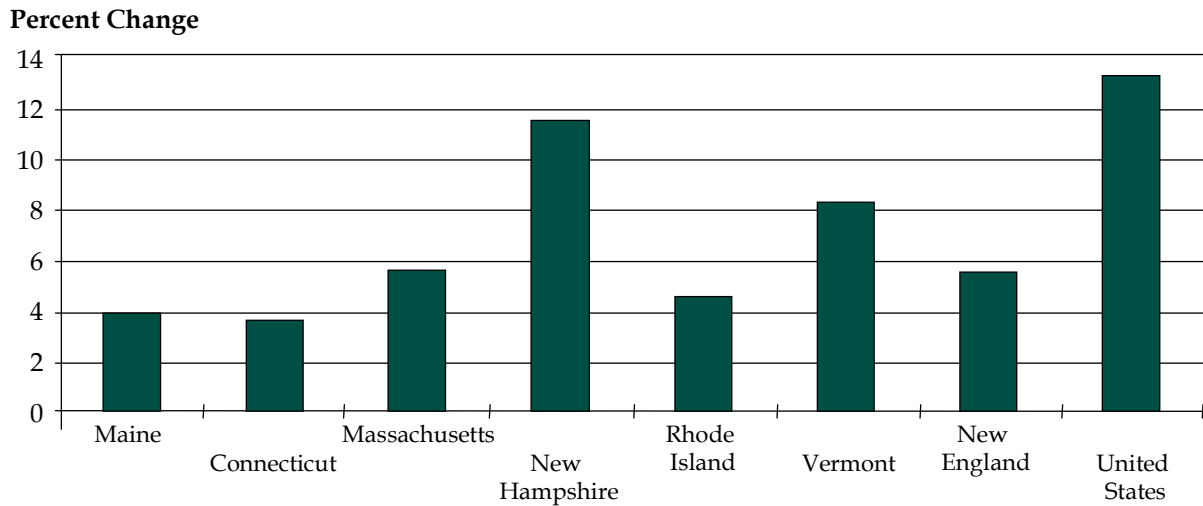
■ C.4 Average Annual Wages

Figure C.8 presents annual average wages for the U.S., New England, and the six New England states in 1998. While New England wages are on average higher than elsewhere in the country (\$35,106 versus \$31,299), there are significant differences between the New England states. Massachusetts and Connecticut have average wages in the \$37,000 to \$40,000 range, while Maine wages are only \$25,385, the lowest among the New England states and only 81 percent of the national average. The relatively low state wages are exacerbated by the decline of manufacturing jobs, the lack of post-secondary educational attainment, and very low R&D expenditures.

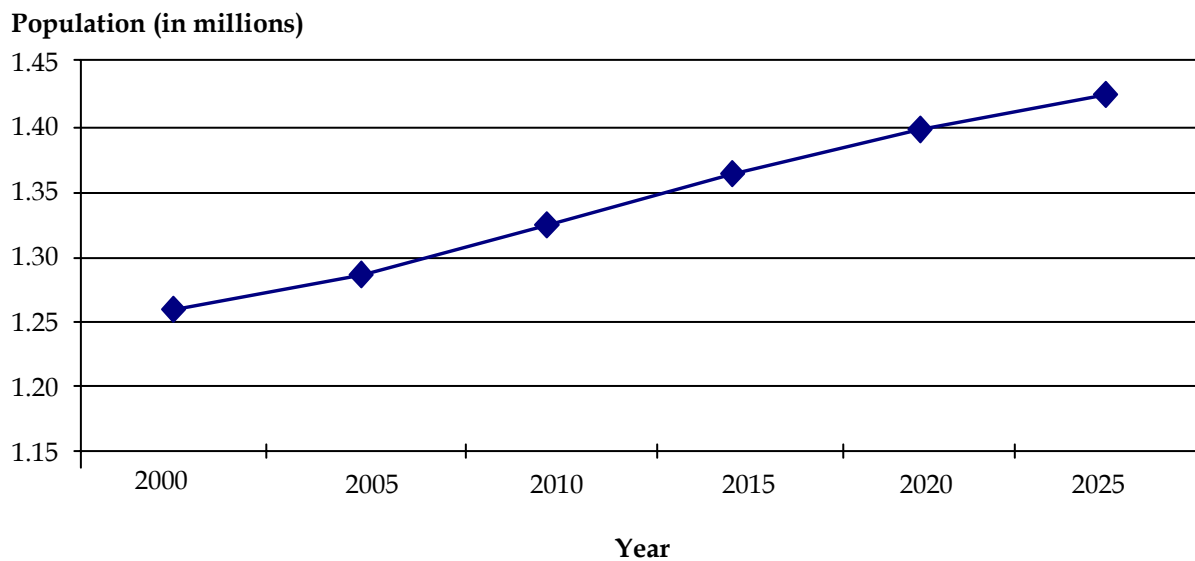
■ C.5 Manufacturing Activity

Maine's share of manufacturing employment to total employment is roughly equal to the U.S. average (15 percent versus 16 percent in 1999). Figure C.9 presents the manufacturing share of total employment for the U.S., New England, and the six New England states in 1999.

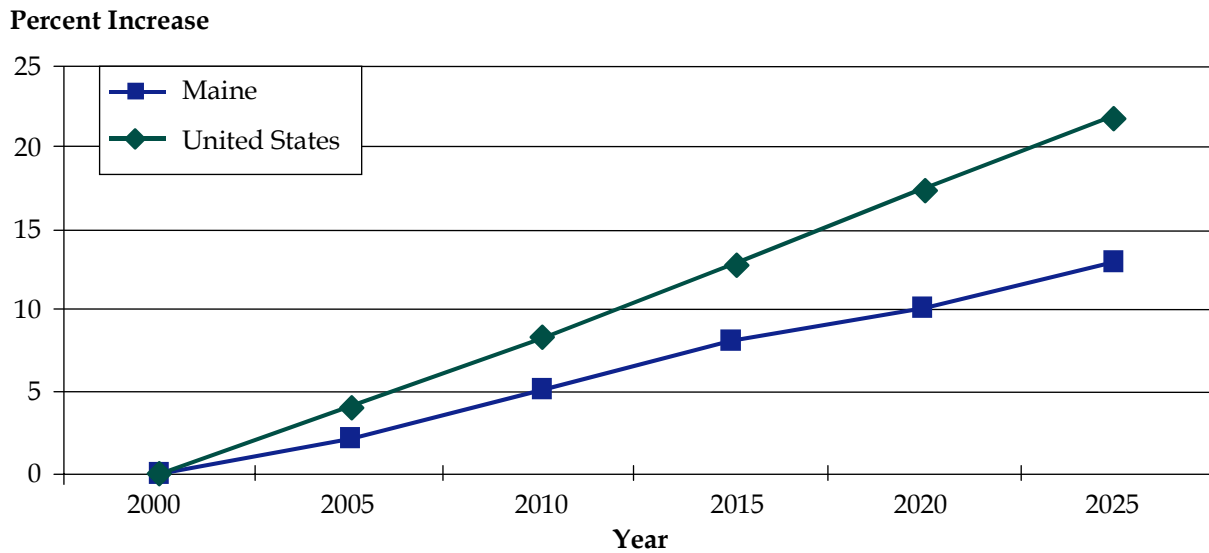
Nationwide, the relative importance of manufacturing decreased over the past decade, but the decrease in Maine was five times greater than the national decline, as shown in Figure C.10. Traditional Maine manufacturing strengths, including transportation equipment, paper, textiles, and leather products, showed marked declines in employment during the 1990s. Losses in higher-technology sectors such as industrial machinery, electronics, and scientific instruments were less pronounced.

Figure C.5 Population Growth, 1990-2000

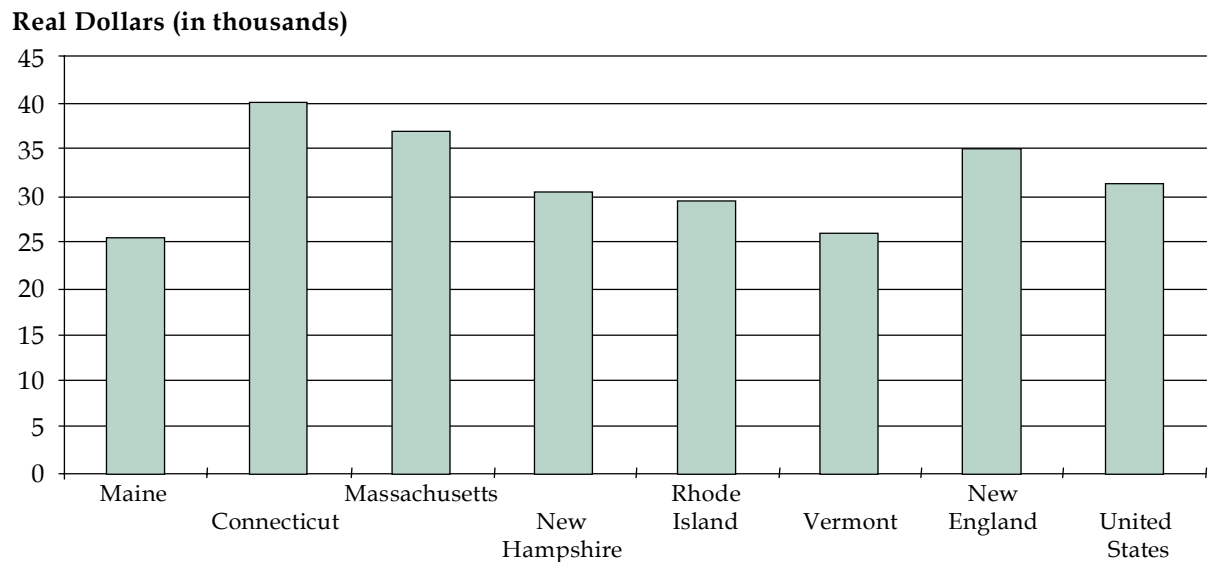
Source: U.S. Census Bureau.

Figure C.6 Maine Population Growth, 2000-2025

Source: U.S. Census Bureau.

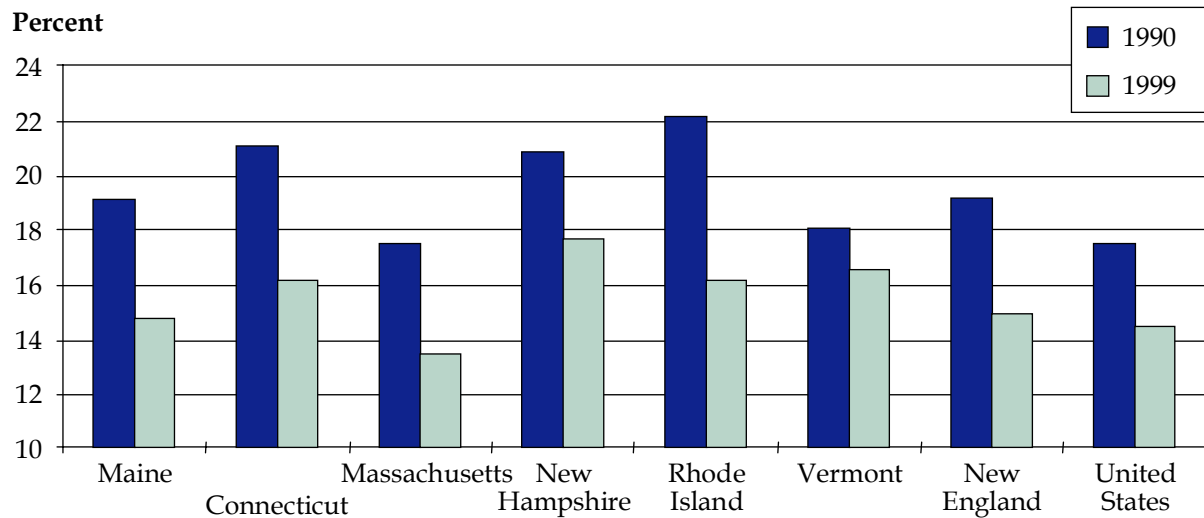
Figure C.7 Population Growth, Maine versus United States, 2000-2025

Source: U.S. Census Bureau.

Figure C.8 Comparison of Annual Average Wages, 1998

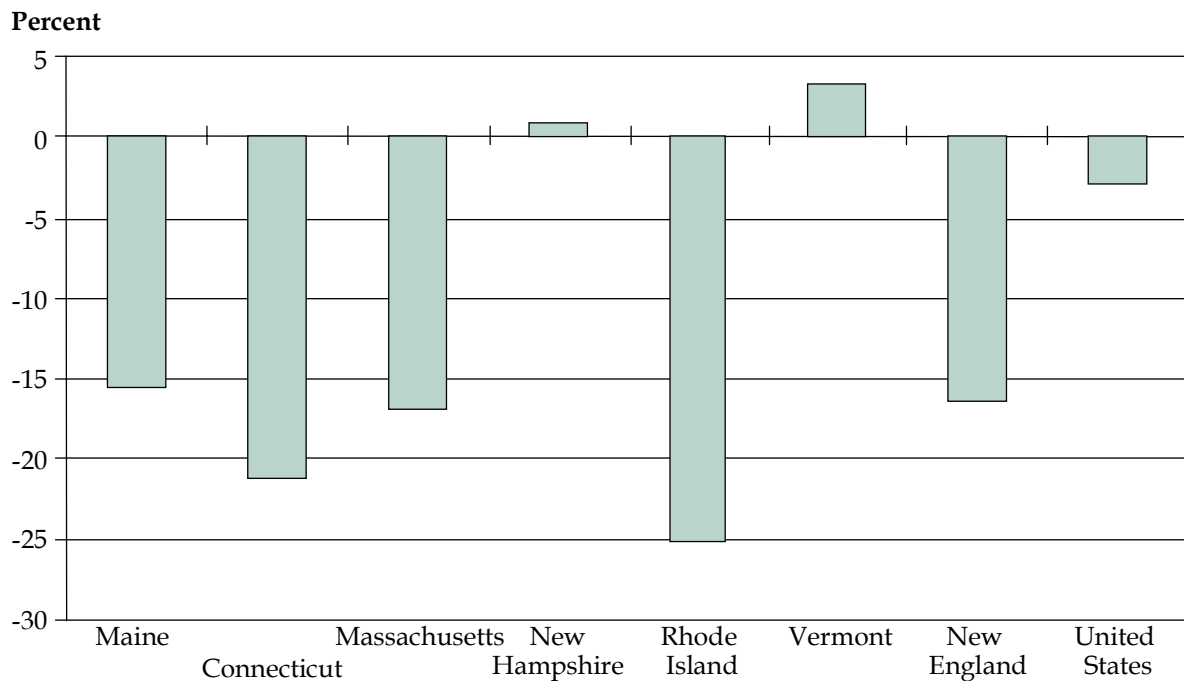
Source: U.S. Bureau of Economic Analysis.

Figure C.9 Manufacturing Share of Total Employment, 1990 and 1999



Source: U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis.

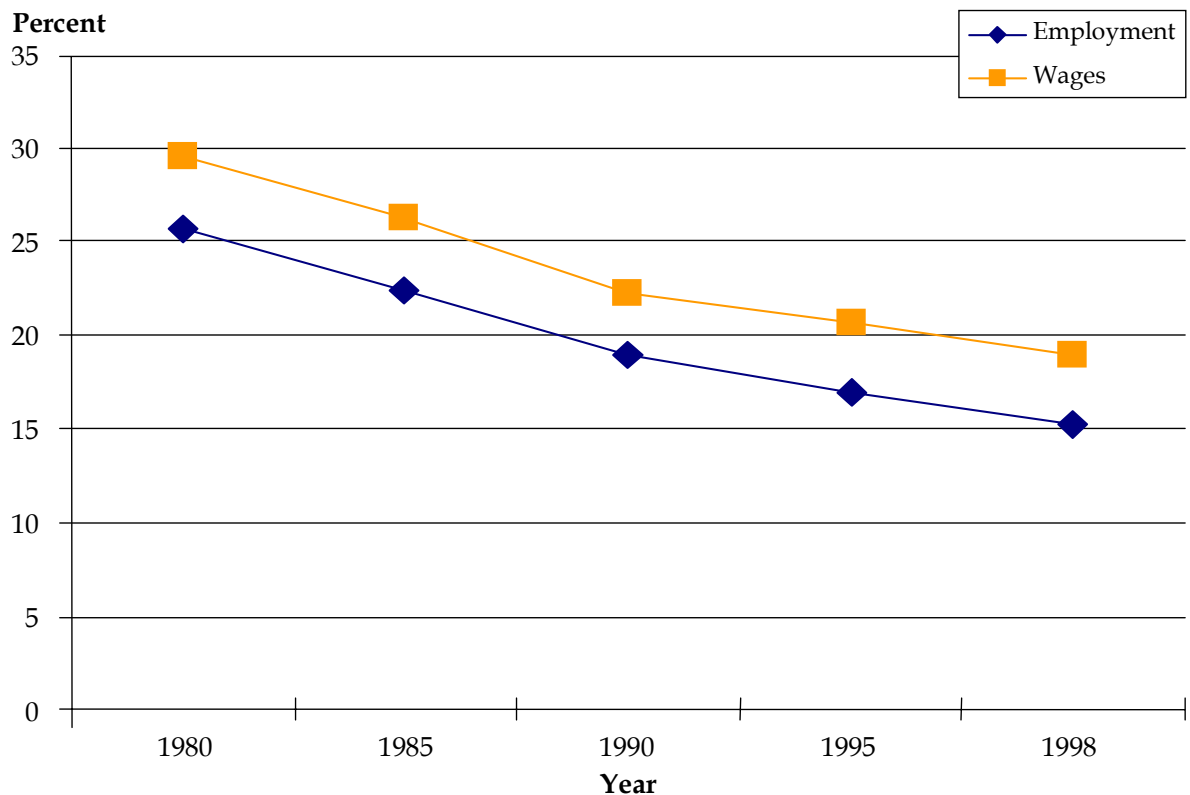
Figure C.10 Change in Manufacturing Employment, 1990-1999



Source: U.S. Bureau of Labor Statistics.

As Maine's employment growth became more concentrated in the services industry, manufacturing's share of total state employment and wages experienced a marked decline between 1980 and 1998. After accounting for over one-quarter of Maine employment and nearly one-third of total wages paid in the State in 1980, the manufacturing sector had become a smaller component of the state economy by 1998. Indicative of the higher average pay levels per employee in manufacturing compared to non-manufacturing jobs, manufacturing's share of total state wages and compensation remained higher than its share of Maine employment throughout the 1980-1998 period. These trends are illustrated in Figure C.11.

Figure C.11 Manufacturing Share of Employment and Wages in Maine, 1980-1998



Source: U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis.

Commodity Flow Patterns

A crucial component in the development of Maine's Integrated Freight Plan is an understanding of the types of commodities currently moving into, out of, and within the State; the modes on which those commodities are traveling; the reasons they are moving the ways they are; and how those movements are expected to change in the future. A quantitative commodity flow analysis provides the means to better understand the current and future commodity flow patterns affecting freight movements in Maine.

■ D.1 Overview

The commodity flow information presented in this section is provided as a complement to the analysis provided in Section 3.0. In this section, commodity movements are analyzed in more detail and describe the following elements:

- External (interstate and Canadian) commodity movements;
- Commodity flows by individual county;
- Detailed mode split analysis; and
- Identification of top commodities by mode.

■ D.2 External Freight Flows

Of the total amount of freight moving within Maine, approximately 31 percent (31.9 million tons in 1998, 39.5 million tons in 2006) have origins or destinations outside of the State. It is necessary to analyze these interstate and Canada freight flows by direction (inbound or outbound) to determine the patterns of these external movements and how they are expected to change. Figure D.1 shows movement type and direction for interstate and Canada freight flows to and from Maine in 1998.

Again, the split among these movement types remains approximately the same in 2006 (i.e., 45 percent Interstate Outbound, 32 percent Interstate Inbound, 8.0 percent Canada Outbound, 15 percent Canada Inbound), while the overall tonnage and growth rates vary. The 2006 forecast shows that the existing trade imbalance (more outbound flows and inbound), and resulting backhaul problems, will continue in the future. Table D.1 shows the breakdown of these forecast tons by type of movement and their respective growth rates.

Figure D.1 Total External Freight Flows to and from Maine by Type and Direction

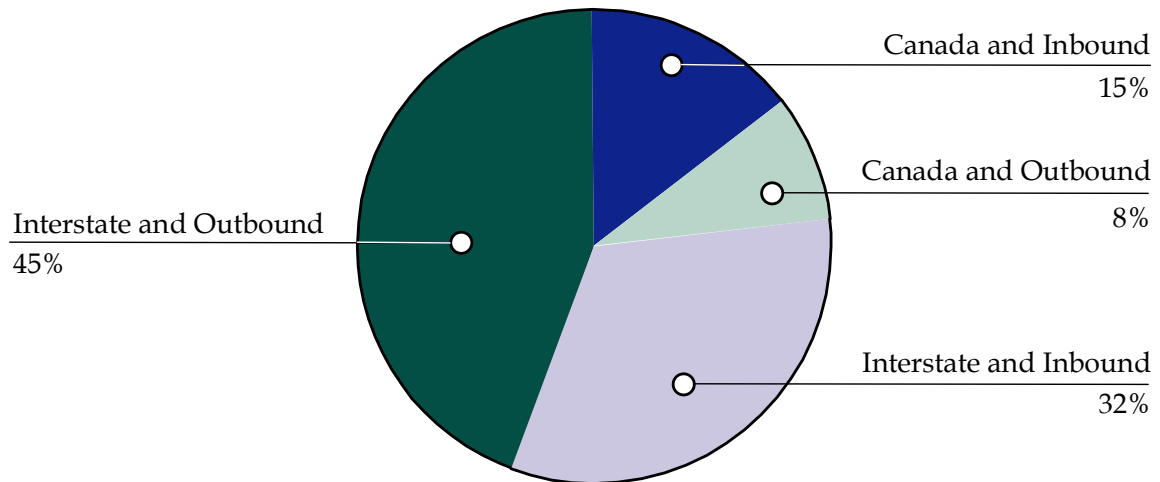


Table D.1 Base-Year and Future Tons and Growth Rates by Movement Type and Direction

Movement Type and Direction	1998 Tons	2006 Tons	Overall Growth	Annual Growth
Canada Inbound	4,721,836	5,931,988	26.63%	3.20%
Canada Outbound	2,677,502	3,226,640	20.51%	2.56%
Interstate Inbound	10,327,551	12,926,513	25.17%	3.15%
Interstate Outbound	14,147,288	17,446,789	23.32%	2.92%

■ D.3 Commodity Flows by County

Figures D.2 and D.3 provide breakdowns of flows, by type, for each county in Maine for 1998 and 2006. Note that at the county level, the total tonnage does not match the state-wide numbers and the intrastate movements are abnormally high. At the county level, each internal movement is counted twice – once as an origin and once as a destination. At the state level, these trips are assigned as either an origin or a destination, and are therefore counted only once.

Figure D.2 Commodity Flows by County, 1998

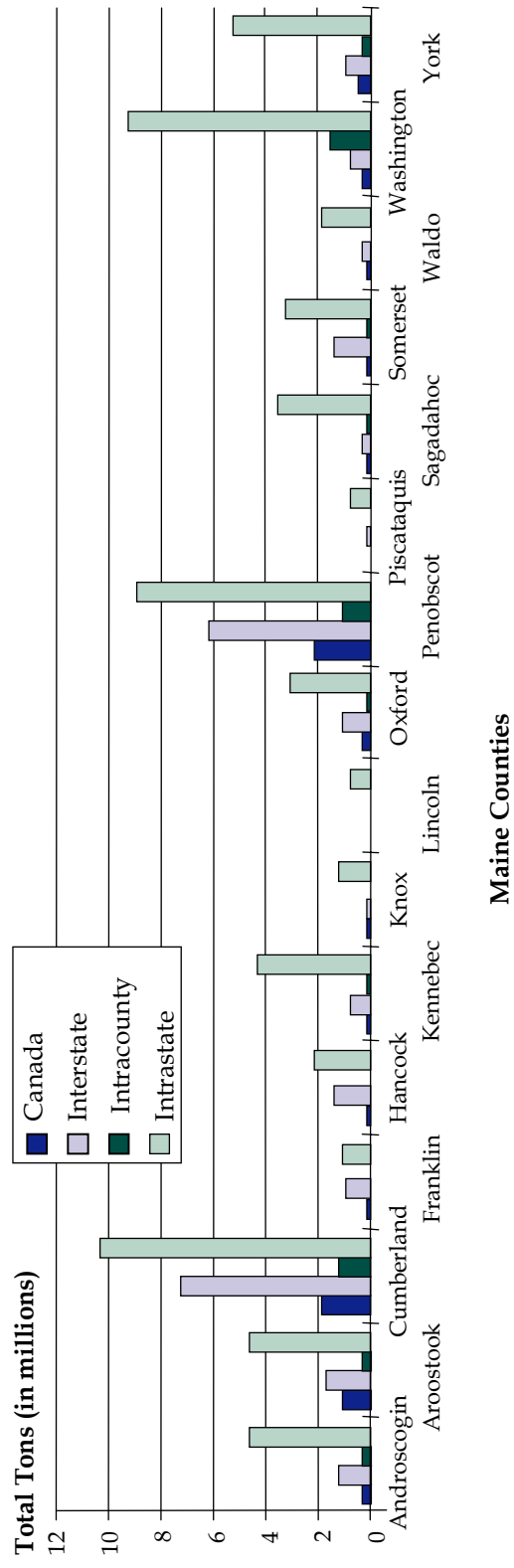
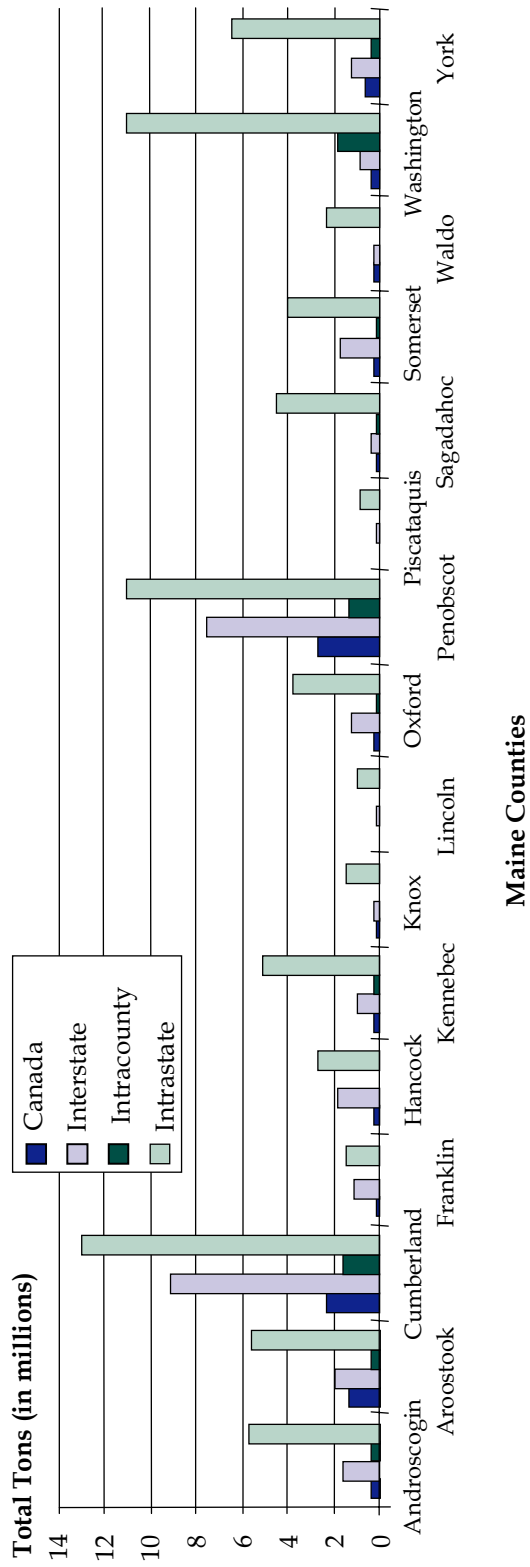


Figure D.3 Commodity Flows by County, 2006



These summary statistics highlight several key points. First, the majority (69 percent) of Maine freight shipments are moving from point-to-point within the State. This may be the result of the redistribution of products being shipped into the State as well as the movement of products and materials between markets. Second, Maine exports more to other states than it imports. This is unusual for states in the Northeastern U.S., which are normally consumption markets (imports greater than exports), however Maine is rich in natural resources, such as lumber, that are used in secondary manufacturing processes elsewhere in the United States, and has a relatively small population. Thirdly, Maine imports more from Canada than it exports, reflecting the large volume of petroleum and other bulk commodities arriving at Maine seaports via Canada. Finally, freight movements within Maine are growing at an average annual pace of 3.0 percent, though inbound shipments from other states and Canada are growing at a more rapid annual pace (3.15 percent and 3.20 percent, respectively) than other types of movements.

■ D.4 Mode Split Analysis

It is important to analyze how freight is moving in order to understand modal dependence and traffic patterns. Like most states, Maine is dependent on trucks for movement of much of its freight, particularly those shipments that both originate and terminate within the State (intrastate and intracounty movements). Some movement types, however, particularly inbound freight shipments from other states and Canada, have a much more diverse mode split. Mode splits are provided in this section in several ways:

- Figure D.4 shows the mode shares for all movements within Maine (intrastate and intracounty shipments) in 1998 and 2006. Approximately 95 percent of these movements were by truck in 1998, totaling over 66.5 million tons. This is logical, as most intrastate and intracounty movements are not of significant distance to make transportation by other modes economically feasible. In 2006, the total amount of intrastate and intracounty shipment is expected to increase to approximately 86.9 million tons, with the relative mode shares remaining constant.
- Figures D.5 and D.6 show the mode shares for Maine's inbound and outbound interstate shipments, respectively. There is a marked difference between how goods arrive in Maine from other states and how they depart Maine bound for other states. While the majority (59 percent/6.1 million tons) of freight terminating in Maine from other states in 1998 was transported by truck, a very large percentage (23 percent/2.4 million tons) arrived via Maine's marine ports. Most of these 2.4 million tons consisted of petroleum products (STCC 29) and waste or scrap material (STCC 40). While the total amount of inbound interstate shipments is expected to increase in 2006, the mode shares are expected to remain constant. Conversely, 80 percent, or 11.4 million tons, of the interstate freight originating in Maine in 1998 traveled by truck; almost all the remaining 20 percent traveled by rail. Again, while the total amount of outbound interstate shipments is expected to increase in 2006, the mode split is expected to remain the same.

Figure D.4 Mode Shares for Intrastate and Intracounty Movement, 1998 and 2006

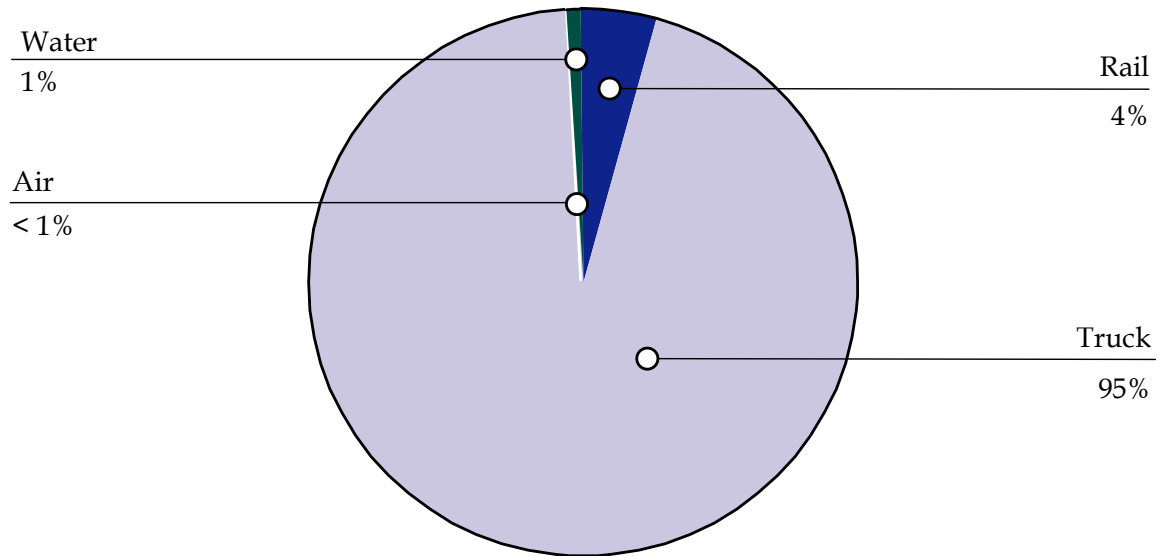


Figure D.5 Inbound Interstate Movements to Maine, 1998 and 2006

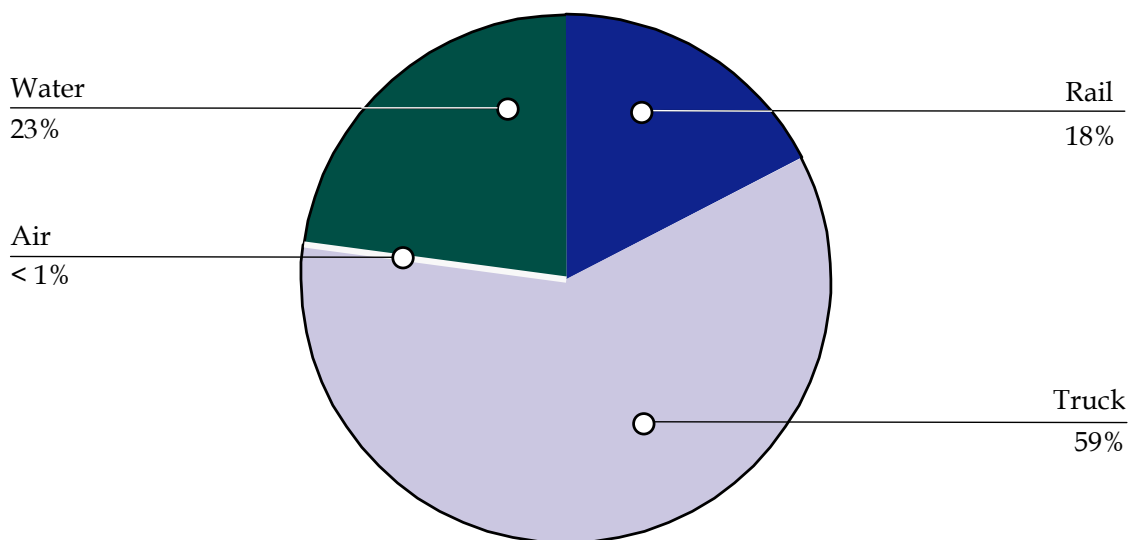
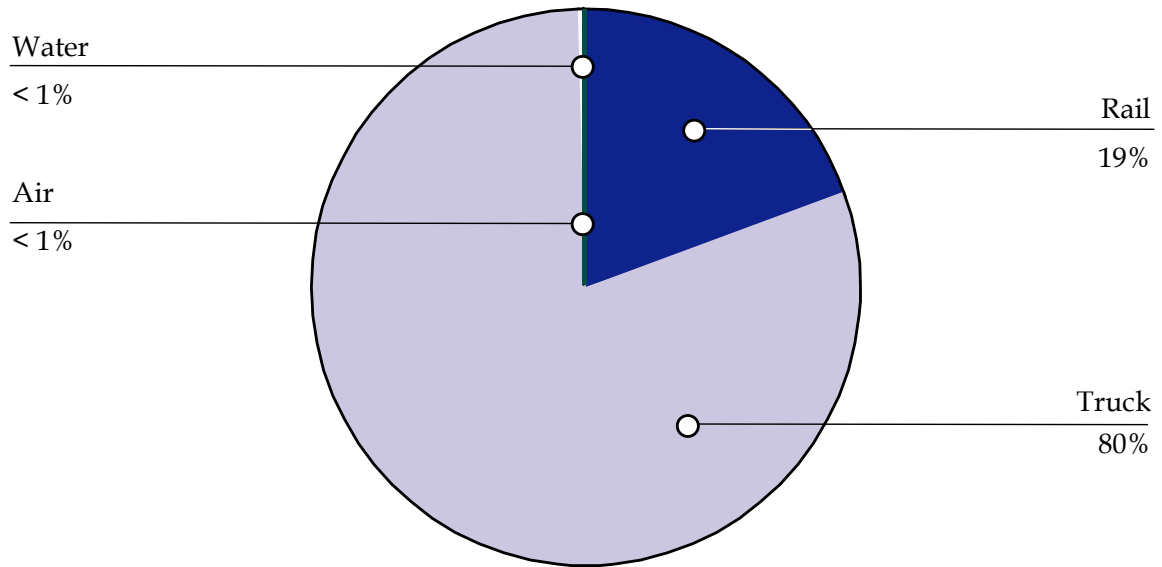


Figure D.6 Outbound Interstate Movements from Maine, 1998 and 2006



- Figures D.7 and D.8 show the mode shares for inbound and outbound Canada shipments, respectively. Again, there is a marked difference between how freight is received from Canada and how it is shipped into Canada. In 1998, 40 percent, or 1.9 million tons, of Maine's overall imports from Canada traveled by water; only 32 percent (1.5 million tons) arrived via truck. Conversely, 95 percent, or 2.5 million tons, of Maine's exports to Canada were transported by truck. Again, while the total amounts of these movements is expected to rise in 2006, the relative mode shares are expected to remain essentially constant.

The mode split analysis reveals two key points for Maine. First, freight movements in Maine are heavily dependent upon the truck mode and will continue to be so in the near term. This is particularly true for intrastate and intracounty movements, 95 percent of which are by truck. Secondly, the mode split analysis indicates that inbound shipments to Maine have a much more diverse mode split than outbound shipments from Maine. This is most likely caused by shipments to Maine's marine ports or other intermodal facilities transferring modes for final delivery by truck to points within the State.

Figure D.7 Inbound Movements from Canada, 1998 and 2006

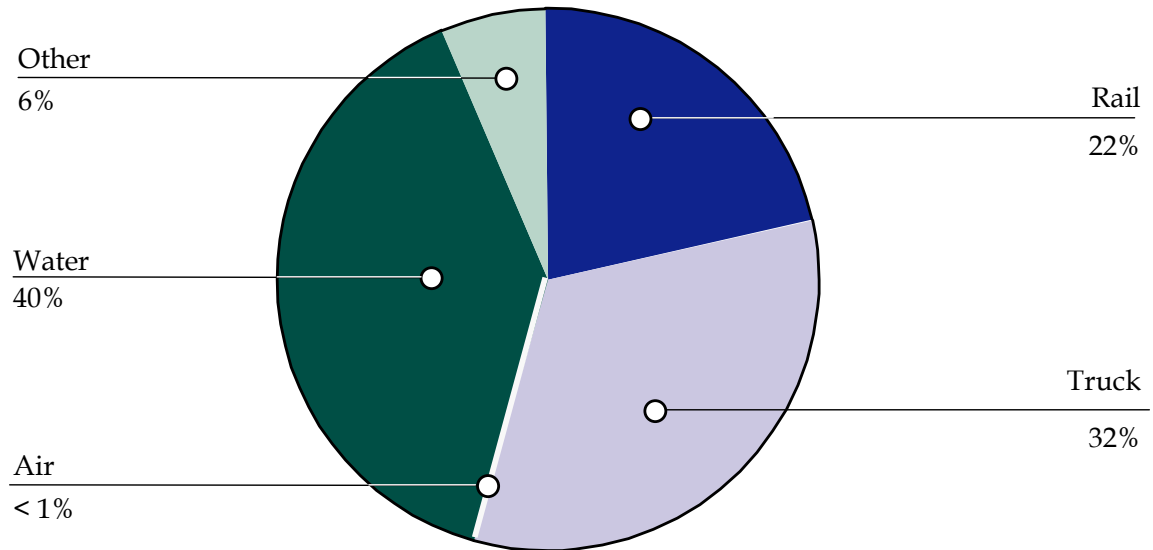
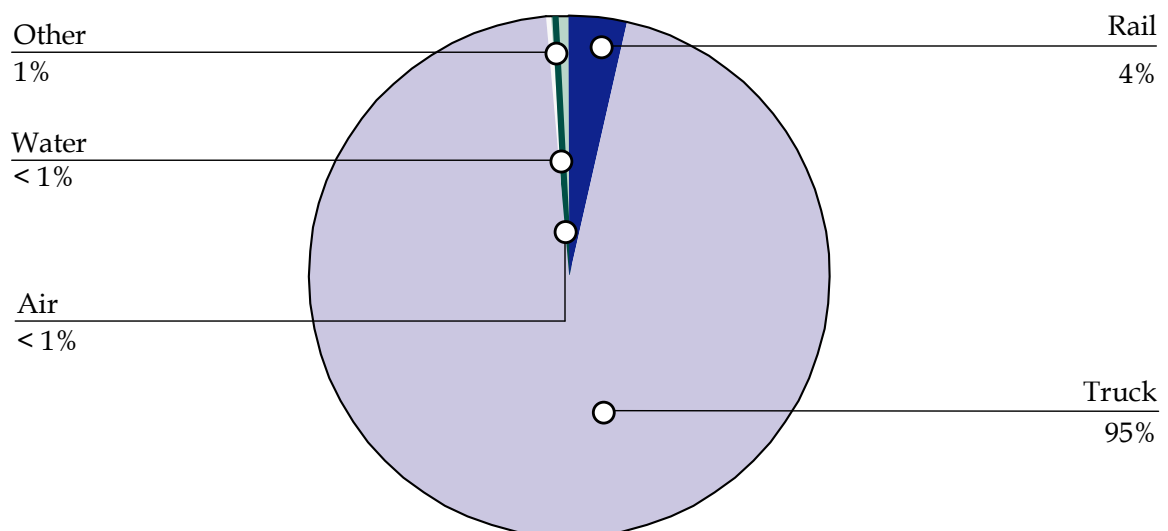


Figure D.8 Outbound Movements to Canada, 1998 and 2006



■ D.5 Identification of Top Commodities

It is also important to understand the types of commodities being moved along Maine's freight transportation infrastructure. While the TRANSEARCH database provided commodity information at the four-digit STCC level, commodities were grouped and analyzed by two-digit STCC. Maine's top commodities were identified in several ways:

- Figures D.9 and D.10 show the top commodities moving between Maine and other states in 1998 and 2006. The top four commodity groups in 1998 accounted for 70 percent of the total interstate flows (17 percent of overall flows), or 17.1 million tons. These commodity groups consisted of pulp and paper products (33 percent); petroleum or coal products (16 percent); food and kindred products (12 percent); and clay, concrete, glass, or stone products (9.0 percent). In 2006, the top four commodity groups are again expected to account for 70 percent of the total interstate flows (17 percent of overall flows), or 21.2 million tons. Again, these commodity groups consist of pulp and paper products (33 percent); petroleum or coal products (16 percent); food and kindred products (12 percent); and clay, concrete, glass, or stone products (9.0 percent).
- Figures D.11 and D.12 show the top commodities moving between Maine and Canada in 1998 and 2006. The top four commodity groups in 1998 accounted for 85 percent of the total Canada flows (6.0 percent of overall flows), or 6.3 million tons. These commodity groups consisted of lumber or wood products (excluding furniture) (35 percent); petroleum or coal products (27 percent); pulp or paper products (16 percent); and chemicals or allied products (7.0 percent). In 2006, the top four commodity groups are expected to account for 81 percent of the total Canada flows (6.0 percent of overall flows), or 7.4 million tons. These commodity groups consist of lumber or wood products (excluding furniture) (34 percent); petroleum or coal products (27 percent); pulp or paper products (13 percent); and chemicals or allied products (7.0 percent).
- Figures D.13 and D.14 show the top commodities moving into, out of, and within Maine by truck in 1998 and 2006. The top four commodity groups in 1998 accounted for 76 percent of the total truck flows (66 percent of overall flows), or 66.9 million tons. These commodity groups consisted of petroleum or coal products (42 percent); clay, concrete, glass, or stone products (14 percent); lumber or wood products (excluding furniture) (11 percent); and pulp or paper products (9.0 percent). In 2006, the top four commodity groups are expected to account for 75 percent of the total truck flows (65 percent of overall flows), or 82.0 million tons. Again, these commodity groups consist of petroleum or coal products (41 percent); clay, concrete, glass, or stone products (14 percent); lumber or wood products (excluding furniture) (11 percent); and pulp or paper products (9.0 percent).

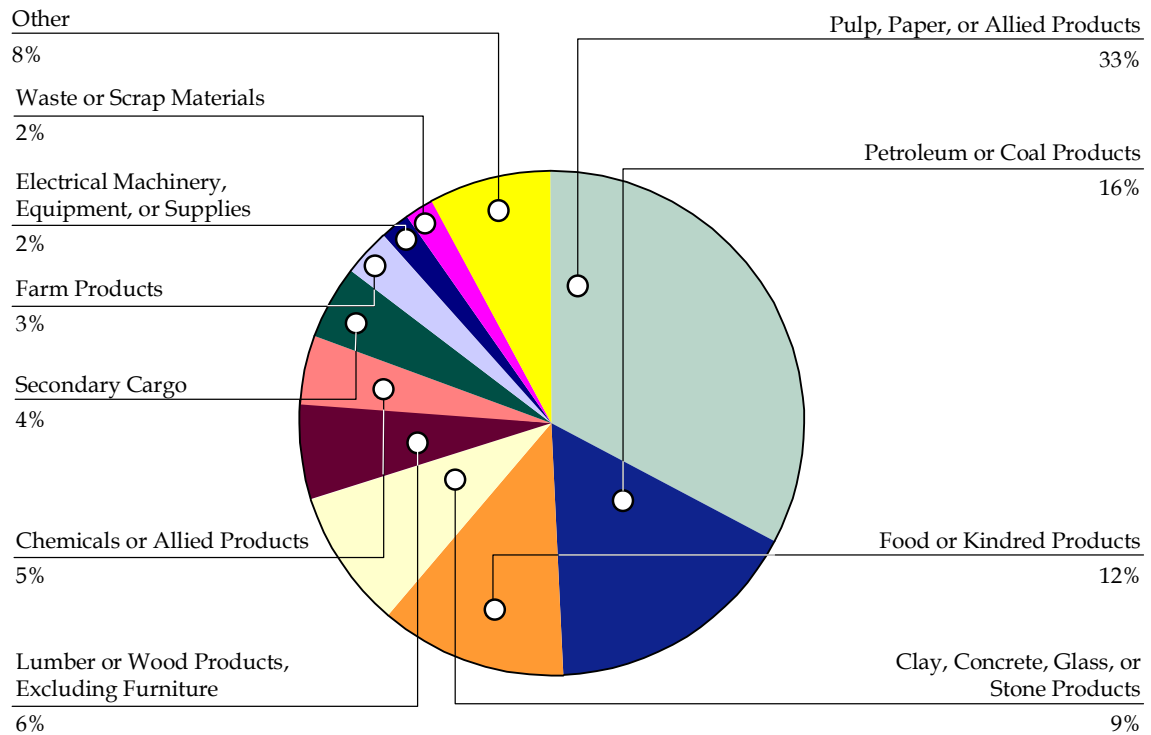
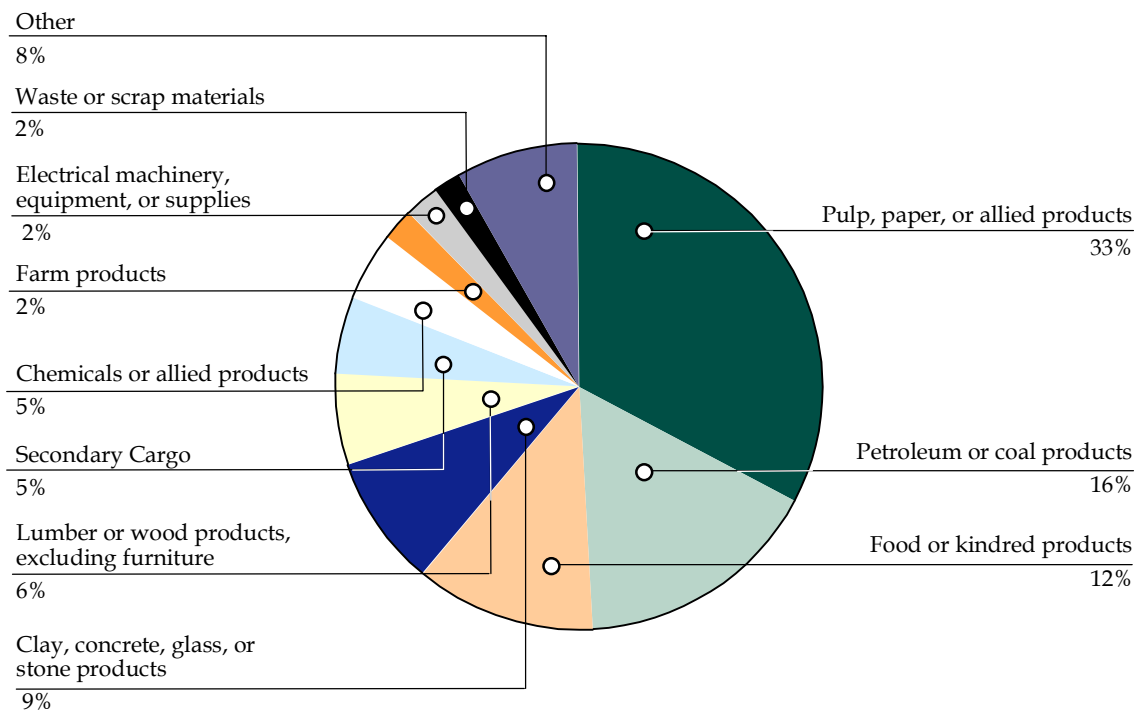
Figure D.9 Top Interstate Commodities for Maine, 1998**Figure D.10 Top Interstate Commodities for Maine, 2006**

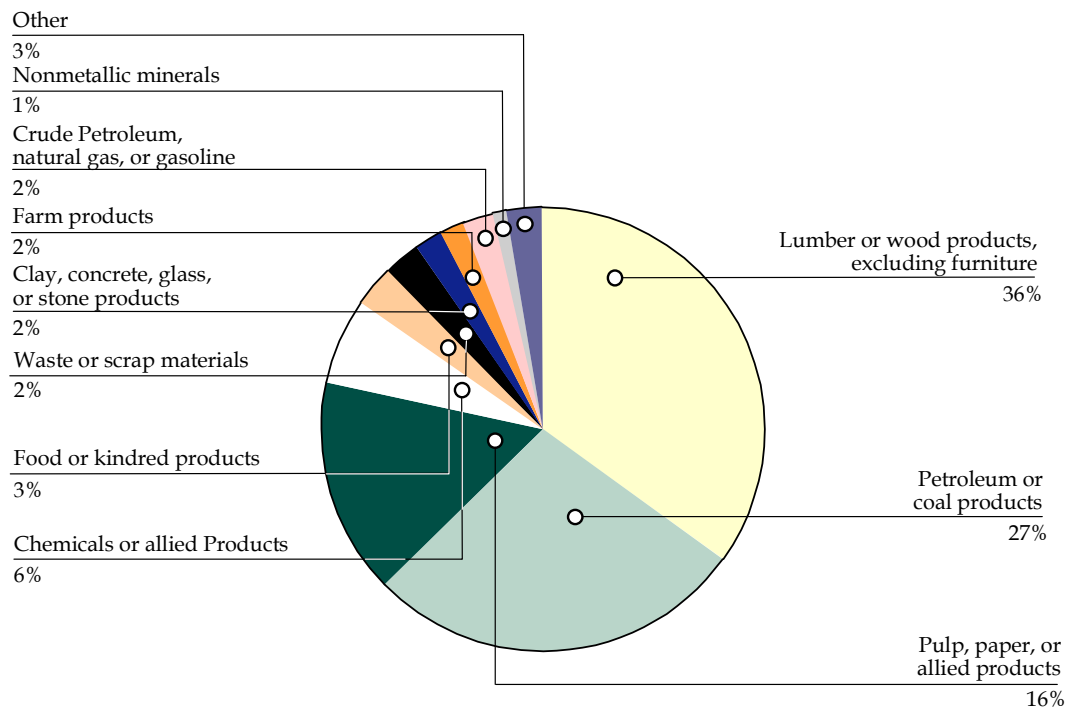
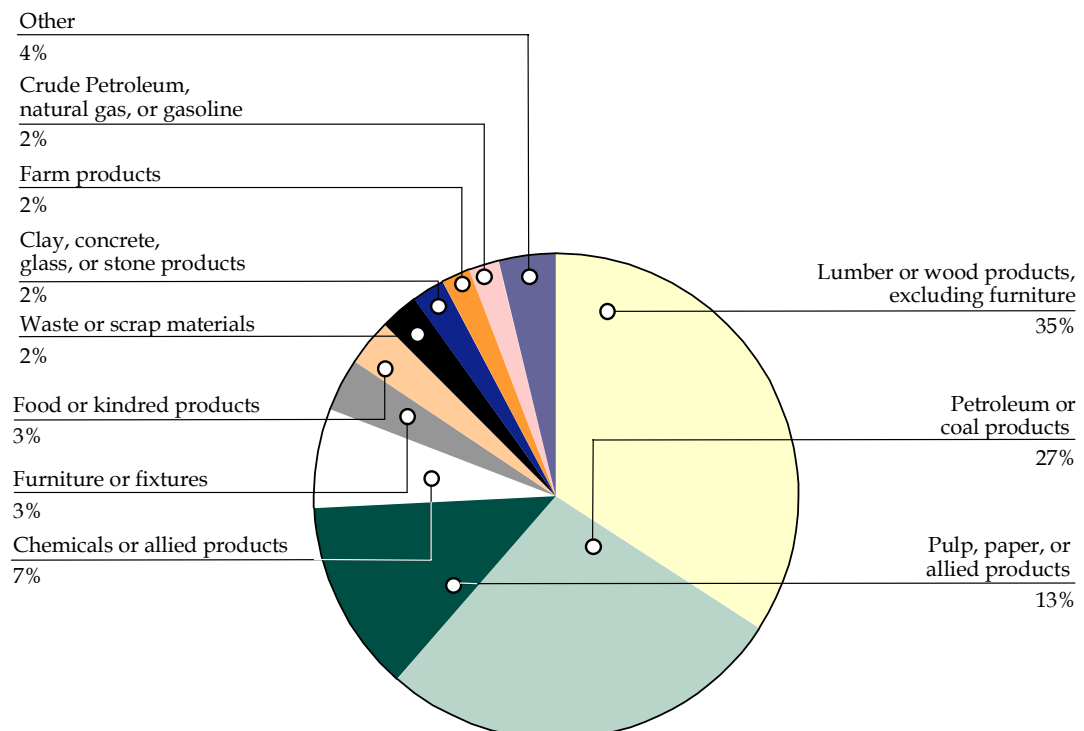
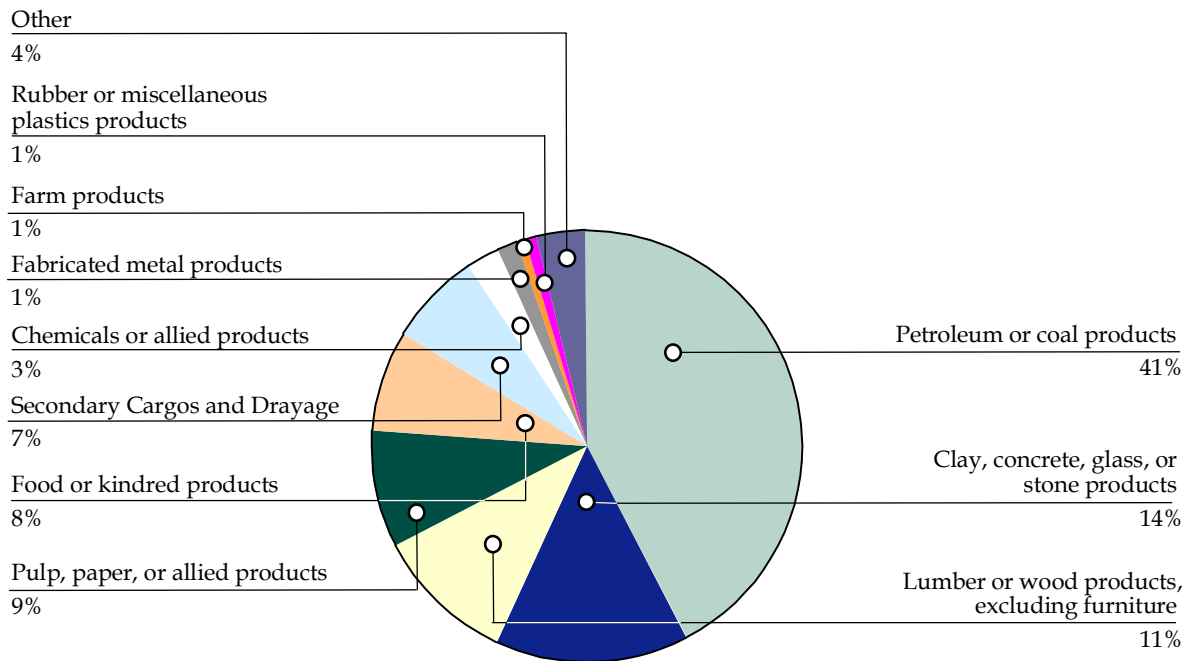
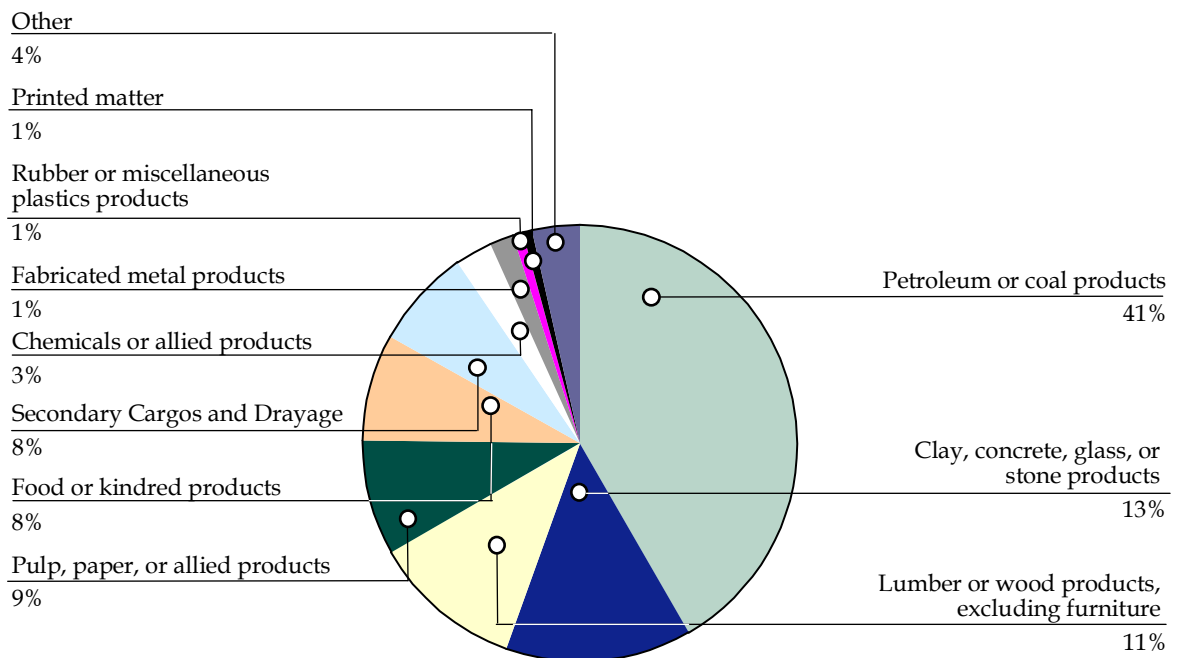
Figure D.11 Top Canada Commodities for Maine, 1998**Figure D.12 Top Canada Commodities for Maine, 2006**

Figure D.13 Top Truck Commodities for Maine, 1998**Figure D.14 Top Truck Commodities for Maine, 2006**

- Figures D.15 and D.16 show the top commodities moving into, out of, and within Maine in by rail in 1998 and 2006. The top four commodity groups in 1998 accounted for 77 percent of the total rail flows (6.5 percent of overall flows), or 6.6 million tons. These commodity groups consisted of pulp or paper products (36 percent); lumber or wood products (excluding furniture) (21 percent); clay, concrete, glass, or stone products (11 percent); and petroleum or coal products (9.0 percent). In 2006, the top four commodity groups are expected to account for 76 percent of the total rail flows (7.0 percent of overall flows), or 8.4 million tons. Again, these commodity groups consist of pulp or paper products (36 percent); lumber or wood products (excluding furniture) (20 percent); clay, concrete, glass, or stone products (11 percent); and petroleum or coal products (9.0 percent).

Figure D.15 Top Rail Commodities for Maine, 1998

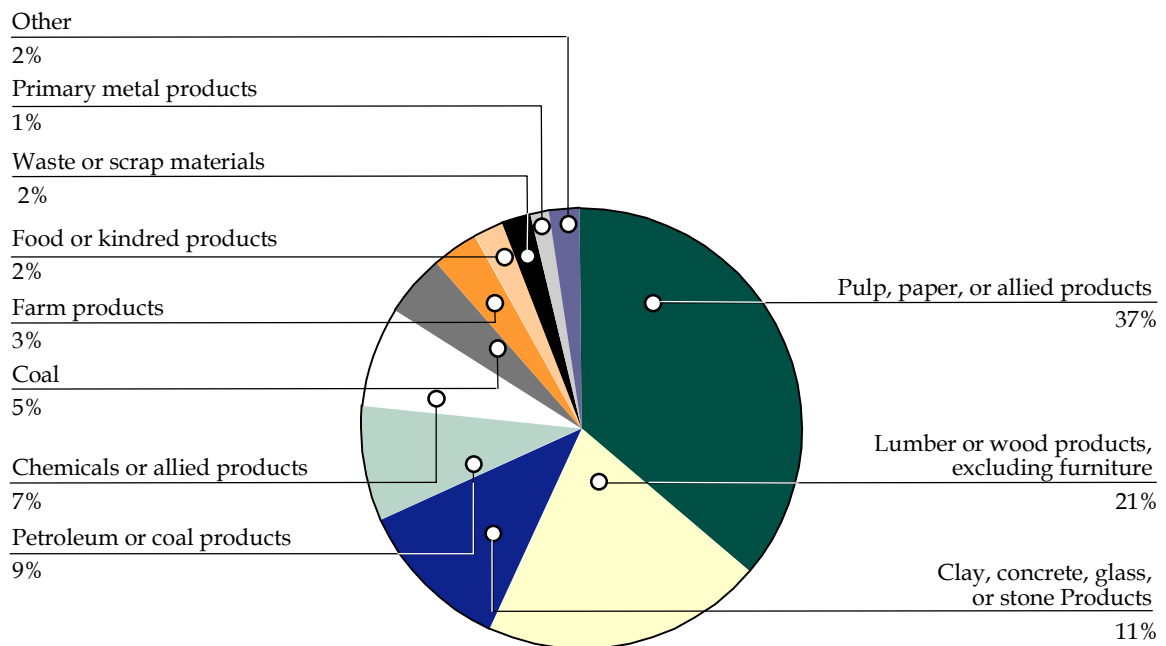
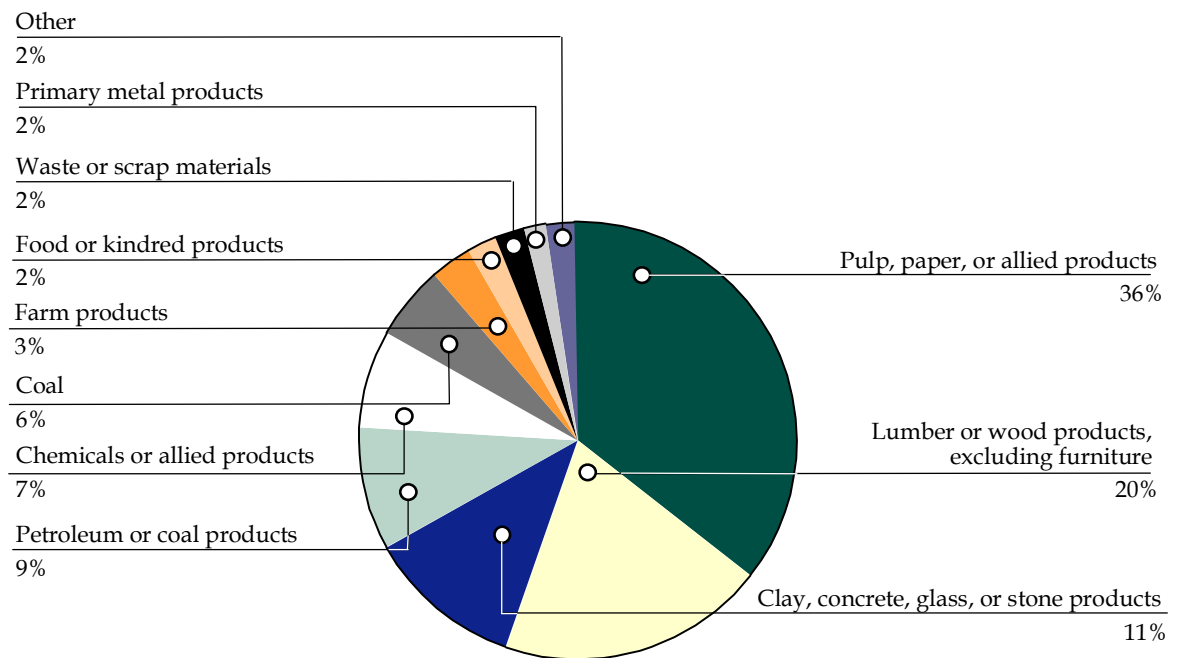


Figure D.16 Top Rail Commodities for Maine, 2006

Appendix E

Load-Matching Web Sites

Load-Matching Web Sites

The following table lists existing load-matching web sites. MDOT does not endorse any of these sites. They are provided only for information purposes and as an illustration of the Internet load-matching services that currently exist.

Site	Membership Costs	Notes
www.truckloadfreight.com	\$50/first month \$35/month thereafter \$99.95/quarter \$179.95/6 months \$239.95/year	Prescreened brokers. Loads updated hourly. Most loads for TL carriers.
www.findtrucks.com	Free	Loads for both TL and LTL carriers.
www.truckstop.com	\$35/month	Loads for both TL and LTL carriers.
www.loadmatch.com	\$50/month, first month free	Load matching for intermodal moves. Most loads for TL carriers.
www.tie-services.com	\$60/month for access to 1 list. \$90/month for access to up to 4 lists. One time \$25 initialization fee.	Maintains 4 lists: Flatbed/Specialty Loads and Trucks, Van/Reefer Loads and Trucks.
www.transplace.com	Unknown	Internet-based transportation logistics company formed by the logistics business units of Covenant Transport, J.B. Hunt, M.S. Carriers, Swift Transportation, U.S. Xpress Enterprises, and Werner Enterprises. Provides member carriers load-matching services web-enabled shipment track and trace capability in addition to combined purchasing power (volume discounts) for fuel, equipment, insurance, and repair parts. TL, LTL, Intermodal, and specialty carriers eligible to participate. 10 carriers have been approved for membership to date.
www.transportation.com	\$14.95/month (individual) \$50/month (groups)	Completely web-enabled transportation marketplace providing load-matching, classifieds, auctions, shipment management (tracking/billing), and transportation management consulting services. Loads for both TL and LTL carriers.
www.netloads.com	Free (will begin charging in near future)	Loads for TL and LTL carriers.

Site	Membership Costs	Notes
www.truckit.com	\$34.95/month \$9.95/month for Instant Wireless Notification System	Provides load matching via Internet database and/or use of Instant Wireless Notification System that will alert carriers to new load postings via PCS phone or alpha-numeric pager. Service includes Weather info and classified ads.
www.backhaul.net	\$20/month	Currently in testing phase. Most loads for TL carriers.
www.freight-terminal.com	\$125/6 months	Most loads for TL carriers.
www.freightconnect.com	\$99.95/month (unlimited access) \$49.95/month (seeking loads or carriers only)	Serves TL carriers only.
www.getloaded.com	\$35/month	Loads for TL and LTL carriers.
www.itruckers.com	Free	Most loads for TL carriers, some LTL loads available.
www.layover.com	Free	Online trucking magazine that offers load-matching services. Loads for both TL and LTL carriers.
www.loadsource.com	\$600/year	Most loads for TL carriers.
www.massmotion.com	\$40/month allows 50 equipment listings and/or 10 permanent lane listings. Additional equipment listings (per month) \$0.25 each. Additional lane listings (per month) \$13 each.	Carriers can post individual equipment and/or permanent lanes for a given truck type between two cities or states/provinces. Loads for both TL and LTL carriers.
www.nettrans.com	\$159/quarter	Internet's oldest truck posting service. Most loads for TL carriers.
www.ifs.net	\$60/month for NPTC/TIA Private Backhaul Network \$85/month for entire IFS database.	In addition to full service load posting and searching. IFS can develop a private network for an individual company. The National Private Truck Council (NPTC) and the Transportation Intermediaries Association (TIA), with IFS, have developed the NPTC/TIA Private Backhaul Network.
www.dat.com	\$155/month	Includes truck stop location information.
www.northeastfreight.com	\$35/first month \$25/month thereafter \$99.95/quarter \$179.95/6 months \$299.95/year	TL and LTL loads originating or terminating in the Northeast U.S.

Site	Membership Costs	Notes
www.nte.com	Free	Allows shippers and carriers to interactively trade ground transportation capacity at a market-driven price in a neutral exchange. Carriers charged a fee to integrate software. Most loads for LTL carriers.
www.dispatchsolutions.com	First month free \$24.95/month \$67.35/quarter \$119/6 months \$199/year	Geared toward owner/operators.
www.americasloadsonline.com	\$74.95/first month \$49.95/month thereafter \$129.95/quarter \$229.95/6 months \$299.95/year	Most loads for TL carriers.
www.truckersbestfriend.com	Free	TL and LTL loads available
www.mytruckload.com	Free	TL and LTL loads available.
www.loadsonline.com	\$20/month	TL and LTL loads available.
www.loadconnect.com	\$30/month	TL and LTL loads available.
www.loaddock.com	Free posting, \$20/month to search loads/trucks	TL and LTL loads available.
www.internetloads.com	Free	TL and LTL loads available.
www.truckloads.net	Free	TL and LTL loads available
www.freightfinder.com	Free	TL and LTL loads available.
www.postbroker.com	\$99.95/year	Provides consolidated load matching information from several independent load-matching sites.
www.emodal.com	Free	Provides container, vessel, and other info for major container terminals.
www.hoploads.com	\$50/month (1-3 logons) \$75/month (4-7 logons) \$100/month (8-10 logons)	Hopper-bottomed carriers only.
www.FOBdesk.com	Free until July, 2001	Chemical shippers/carriers only.
www.Eflatbed.com	Free	Flatbed loads/equipment only.

